55-4920-402-13+P

TECHNICAL MANUAL

OPERATOR'S, AVIATION UNIT AND INTERMEDIATE MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

VIBREX BALANCING KIT
PART NO. B4591
NSN 4920-01-040-7816

This copy is a reprint which includes current pages from Changes 1 through 6.

HEADQUARTERS, DEPARTMENT OF THE ARMY
15 AUGUST 1980

D 101.11:

WARNING

HIGH VOLTAGE

is used in the operation of this equipment.

DEATH ON CONTACT

may result if personnel fail to observe the safety precautions.
Learn the areas containing high voltage in each piece of equipment.
Be careful not to contact high voltage connections when installing or operating this equipment.

Before working inside the equipment, turn power off and ground points of high potential before touching them.

ULTRAVIOLET RADIATION

is used in the operation of the Strobex.
The flash tube emits dangerous ultraviolet light that can damage the eyes.
Do not look directly at the light.

CAUTION

Extreme care should be exercised when using the VIBREX test set.
This unit contains delicate electronic components and assemblies which may be easily damaged if subjected to physical abuse due to improper handling.

WARNING

The flash tube is at several atmospheres pressure. Wear a safety shield or safety glasses. Avoid twisting or bending the flash tube or the quartz glass with fracture. Allow several minutes for flash tube to cool and the voltages to bleed off. Use gloves if available.

CHANGE NO. 6

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WASHINGTON, D.C., 6 January 1988

Operator's, Aviation Unit
and Intermediate Maintenance Manual
(Including Repair Parts and
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VIBREX BALANCING KIT
PART NO. B4591
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C-19 and C-20/C-21	C-19 and C-20/C-21
C-23 and C-24/C-25	C-23 and C-24/C-25
C-27 and C-28/C-29	C-27 and C-28/C-29
C-31 and C-32/C-33	C-31 and C-32/C-33
C-35 through C-47/C-48	C-35 through C-55/C-56

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VIBREX BALANCING KIT

PART NO. B4591

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B-1 through B-4	B-1 through B-4
C-1 through C-32	C-1 through C-47/C-48

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C-23 and C-24	C-23 and C-24
C-27 through C-32	C-27 through C-32

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WARNING

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DEATH ON CONTACT
may result if personnel fail to observe the safety precautions.
Learn the areas containing high voltage in each piece of equipment.
Be careful not to contact high voltage connections when installing or operating this equipment.
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ULTRAVIOLET RADIATION

is used in the operation of the Storbex.
The flash tube emits dangerous ultraviolet light that can damage the eyes.
Do not look directly at the light.

CAUTION

Extreme care should be exercised when using the VIBREX test set.
This unit contains delicate electronic components and assemblies which may be easily damaged if subjected to physical abuse due to improper handling.

WARNING

The flash tube is at several atmospheres pressure. Wear a safety shield or safety glasses. Avoid twisting or bending the flash tube or the quartz glass with fracture. Allow several minutes for flash tube to cool and the voltages to bleed off. Use gloves if available.

CHANGE
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Operator's, Aviation Unit
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VIBREX BALANCING KIT

PART NO. B4591

NSN 4920-01-040-7816

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3-5 through 3-8	3-5 through 3-8
C-5 through C-8	C-5 through C-8

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Chapter 3	3-5 thru 3-10	3-5 thru 3-10

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C 1

CHANGE
No. 1

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OPERATOR'S, AVIATION UNIT
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(INCLUDING REPAIR PARTS AND
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OPERATOR'S, AVIATION UNIT AND INTERMEDIATE MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

VIBREX BALANCING KIT
PART NO. 84591
NSN 4920-01-046-7816

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1. Scope. The VIBREX Balancing Kit (fig. 1-1) (hereafter referred to as VIBREX) is used to measure and indicate the level of vibrations induced by the main rotor and tail rotor of a helicopter. The VIBREX analyzes the vibration induced by out-of-track, or out-of-balance rotors, and then by plotting vibration amplitude and clock angle on a chart, the amount and location of rotor track or weight changes is determined. In addition, the VIBREX is used in troubleshooting by measuring the revolutions-per-minute (RPM) or frequency of unknown disturbances.

1-2. Forms and Records. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed and prescribed by TM 38-750.

Section II. DESCRIPTION AND LEADING PARTICULARS

1-3. Description. The VIBREX is housed in a Carrying Case and consists of the components listed in table 1-1. The main units of the VIBREX are Balancer/Phazor 177M6A, Strobex Tracker 135M11, and VIBREX Tester 11. The primary airframe mounted components are three Accelerometers 4177B and two Magnetic Pickups 3030AN.

CAUTION

Extreme care should be exercised when using the VIBREX test set. This unit contains delicate electronic components and assemblies which may be easily damaged if subjected to physical abuse due to improper handling.

a. Balancer/Phazor 177M6A. The key feature of the Balancer/Phazor (fig. 1-2) (hereafter referred to as Balancer) is a tuneable, electronic bandpass filter which is tuned to reject all but one frequency, or vibration under study. The meter reads the level of vibration at the rate (RPM) of concern, which is indicative of the amount of the required change (track or balance). The Phazor section contains a phase meter that reads clock angle, or phase angle, between a one-per-revolution Magnetic Pickup azimuth signal from the rotor and a vibration signal from the Accelerometer.

b. Strobex Tracker 135M11. The Strobex Tracker (fig. 1-3) (hereafter referred to as Strobex) is a small hand held lightweight combination power supply and strobe flash tube. It illuminates reflective targets on the tail rotor to measure tail rotor clock angle, and on the main rotor to indicate rotor track and lead-lag.

c. VIBREX Tester 11. The VIBREX Tester (fig. 1-4) (hereafter referred to as Tester) provides accurate calibration and complete functional check of the VIBREX. The Tester shakes (vibrates) the Accelerometer to measure vibration amplitude in inches-per-second (IPS) and rate (RPM) functions of the Balancer. Phase or clock angle functions of the Phazor section are verified by a rotating interrupter plate and the Magnetic Pickup to provide double and single interrupter logic signals. The RPM dial of the Strobex is accurately checked against the known rotor speed of the Tester motor.

d. Accessories. Following is a list of accessories (fig. 1-1) that are used with the Balancer, Strobex, and Tester:

(1) Magnetic Pickups and Interrupter Sets. Pickup device to provide magnetic impulses from rotor to Balancer. Magnetic Pickups are located on stationary platforms while Interrupter Sets are located on rotating platforms.

(2) Accelerometers. Provides the Balancer with an electrical representation of the physical motion of the point to which it is attached.

(3) Reflective and Tip Target Sets. Reflects Strobex flash pulses back to Strobex operator.

(4) Balance and Tracking Charts. Used to calculate weight, sweep, pitch link, tab, etc., to correct rotor problems.

(5) Signal Simulator. Provides signal simulation for troubleshooting the Balancer and Strobex.

(6) Gram Scale. Provides accurate weight measurement for weights to be installed on rotors.

(7) Carrying Case. Provides a compact and secure method of transporting the VIBREX. Also provides convenient storage space for VIBREX components.

(8) Cables. Applies power to and interfaces VIBREX with airframe mounted components.

(9) Brackets. Airframe mounting devices for Accelerometers and Magnetic Pickup.

(10) Checklists. Provides installation and operating procedures for individual aircraft installations.

1-4. Leading Particulars. Table 1-2 provides the leading particulars that consist of the VIBREX main features, specifications, characteristics, and physical dimensions. Figure 1-5 shows the physical dimensions and weights.

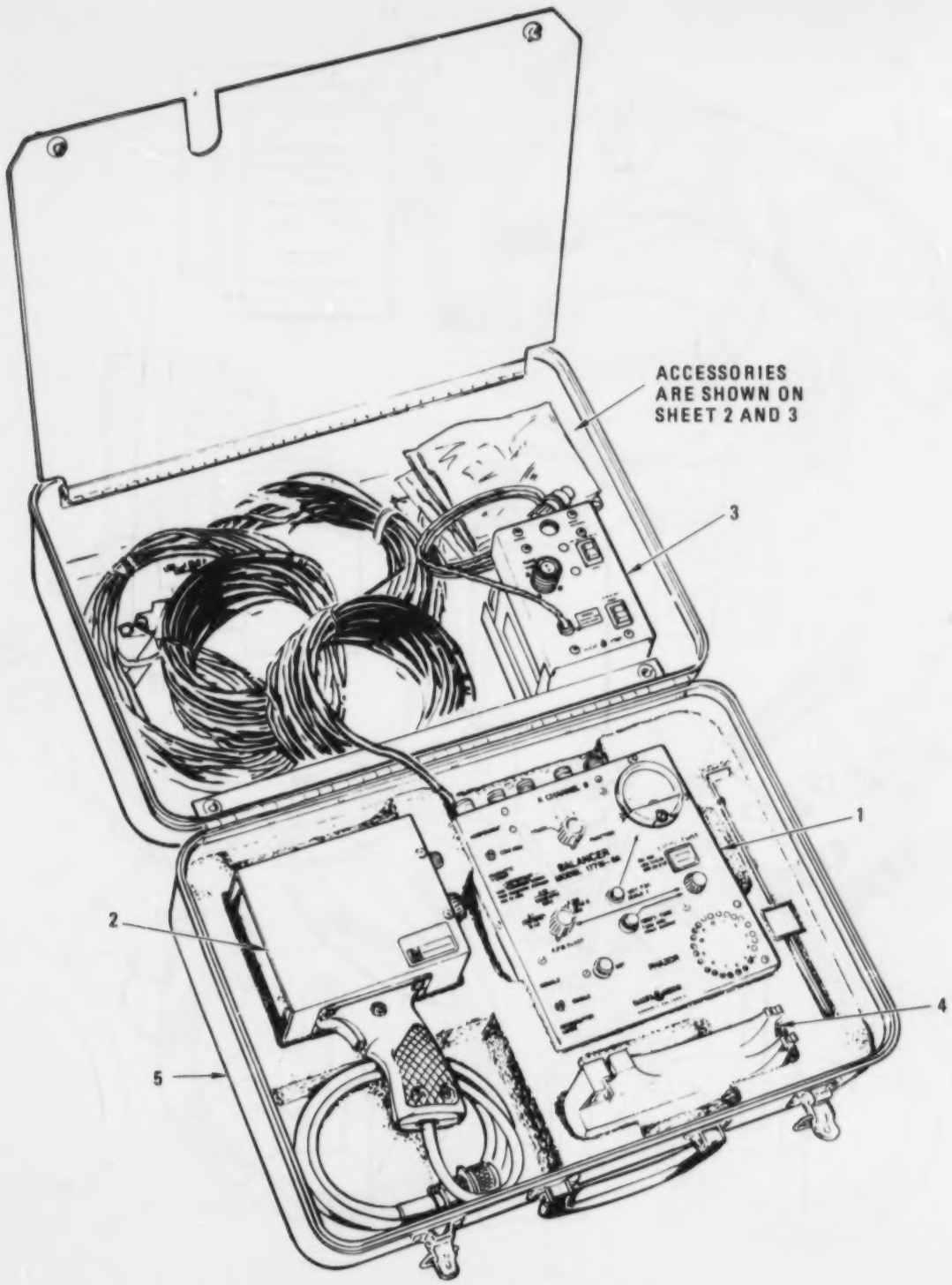


Figure 1-1. VIBREX Balancing Kit (Sheet 1 of 3)

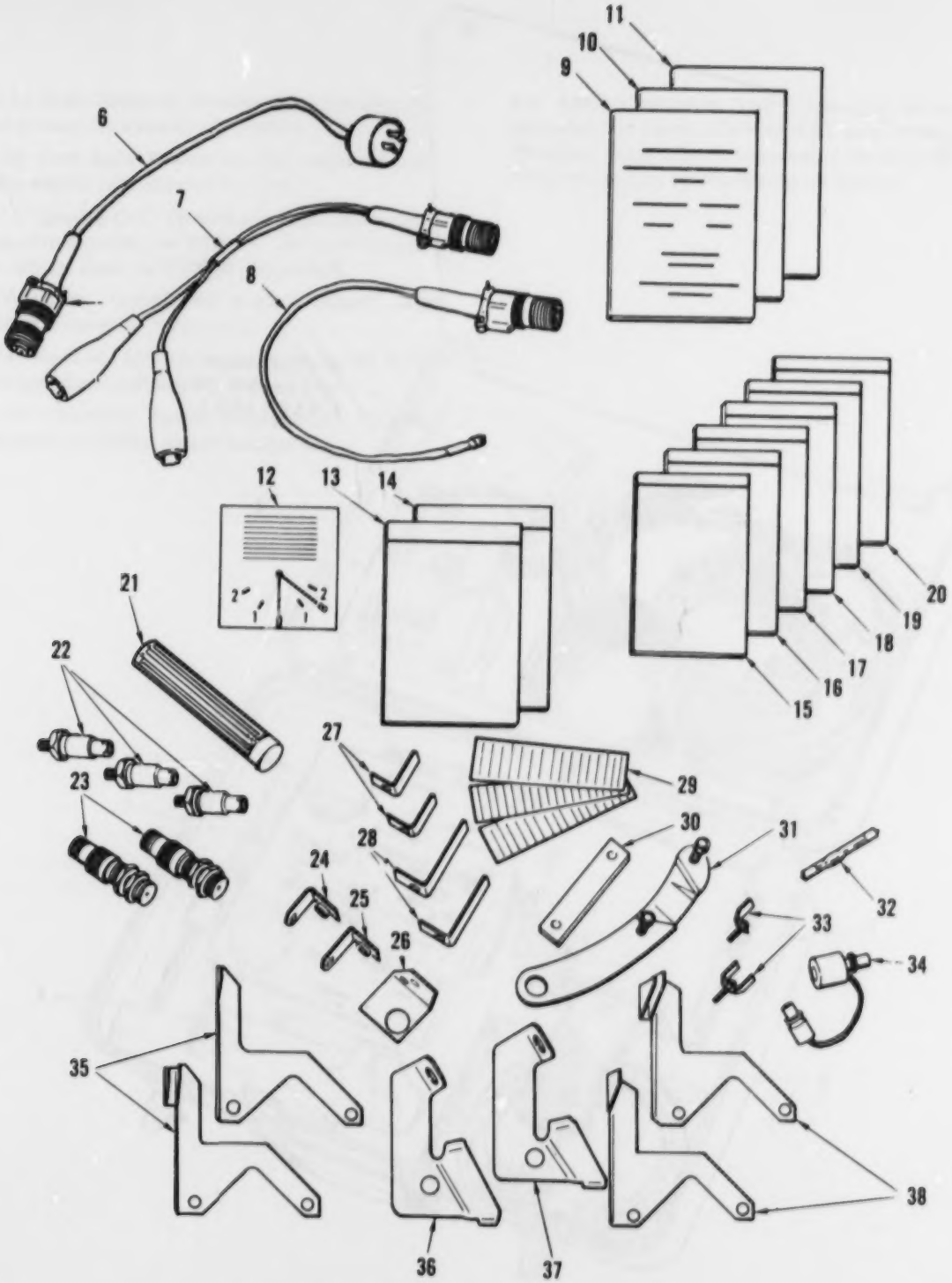


Figure 1-1. VIBREX Balancing Kit (Sheet 2 of 3)

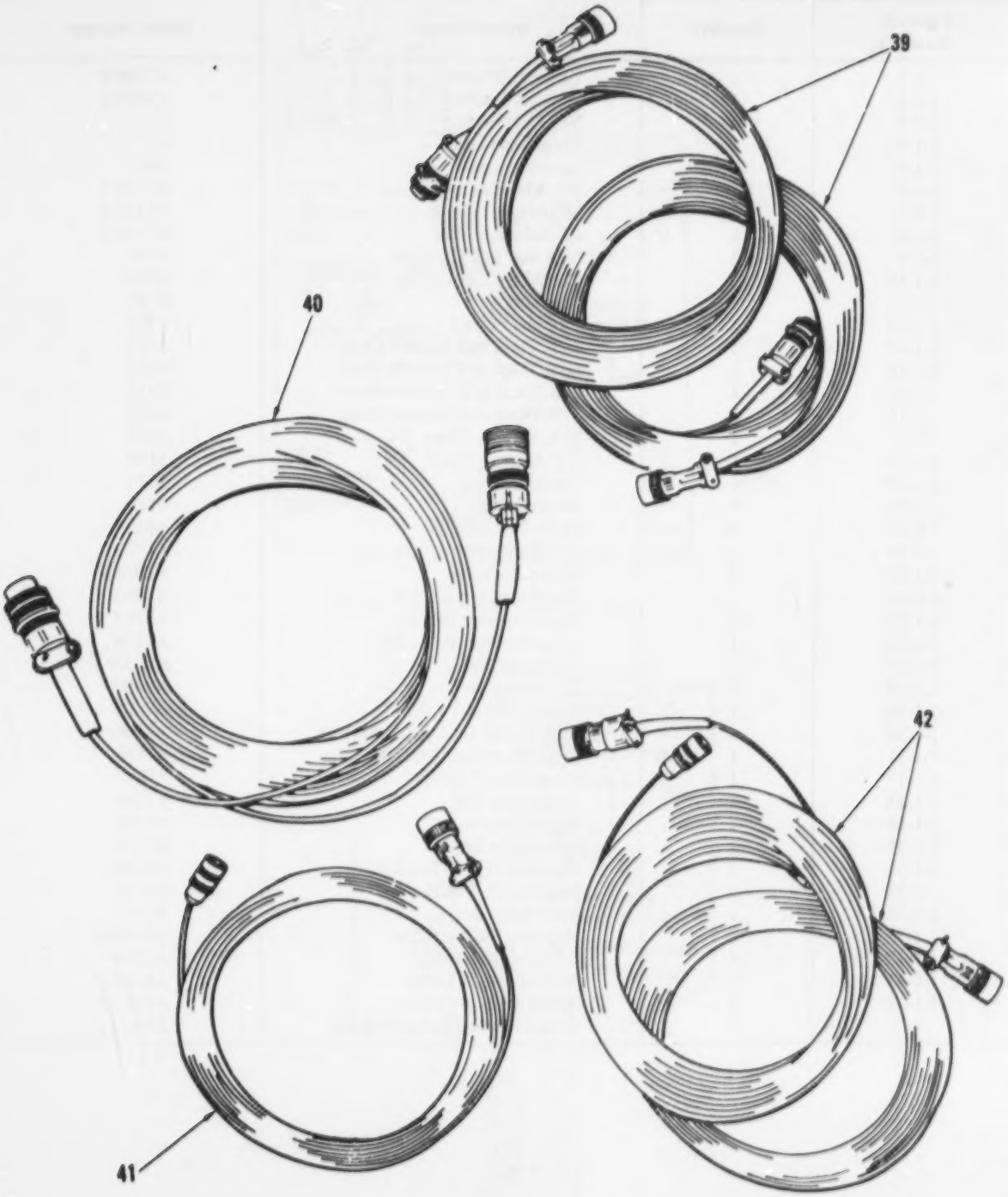


Figure 1-1. VIBREX Balancing Kit (Sheet 3 of 3)

Table 1-1. VIBREX Balancing Kit Components

Figure & Index No.	Quantity	Nomenclature	Model Number
1-1-1	1	Balancer/Phazor	177M6A
1-1-2	1	Strobex Tracker	135M11
1-1-3	1	VIBREX Tester	11
1-1-4	1	Gram Scale	47
1-1-5	1	Carrying Case	34B
1-1-6	1	DC Adapter Cable	B3140-1
1-1-7	1	DC Adapter Cable	B3140-5
1-1-8	1	DC Adapter Cable	B3140-9
1-1-9	1	M/R and T/R Checklist	4300
1-1-10	1	Checklist	4280
1-1-11	1	Checklist	4290
1-1-12	1	Corrector Chart	3597
1-1-13	1	M/R Track and Balance Chart	4262
1-1-14	1	M/R Track and Balance Chart	4273
1-1-15	1	T/R Track and Balance Chart	3413
1-1-16	1	T/R Track and Balance Chart	4020
1-1-17	1	M/R Balance Chart	3411
1-1-18	1	T/R Balance Chart	3438
1-1-19	1	Tracking Chart	3875
1-1-20	1	Balance Chart	4471
1-1-21	1	Cable Ties Package	4208
1-1-22	3	Accelerometer	4177B
1-1-23	2	Magnetic Pickup	3030AN
1-1-24	1	Accelerometer Bracket	A3382
1-1-25	1	Accelerometer Bracket	A3383
1-1-26	1	Magnetic Pickup Bracket	A3104
1-1-27	1	Tip Target Set	A3428-2
1-1-28	1	Tip Target Set	A3387
1-1-29	1	Target Patches	A3300
1-1-30	1	Backup Bar (used with B3159)	A3160
1-1-31	1	Magnetic Pickup Bracket	B3159
1-1-32	1	Flash Tube (Spare)	35S
1-1-33	1	Interrupter Set	B3380
1-1-34	1	Signal Simulator	B4305
1-1-35	1	Interrupter Set	B3251
1-1-36	1	Magnetic Pickup Bracket	C4559
1-1-37	1	Magnetic Pickup Bracket	C4758
1-1-38	1	Interrupter Set	B3103
1-1-39	2	Magnetic Pickup Cable	A3319-2
1-1-40	1	DC Extension Cable	A3529
1-1-41	1	Accelerometer Cable	A4296-1
1-1-42	2	Accelerometer Cable	A4296-2
	1	Serial Number/Warranty Label	AW4756

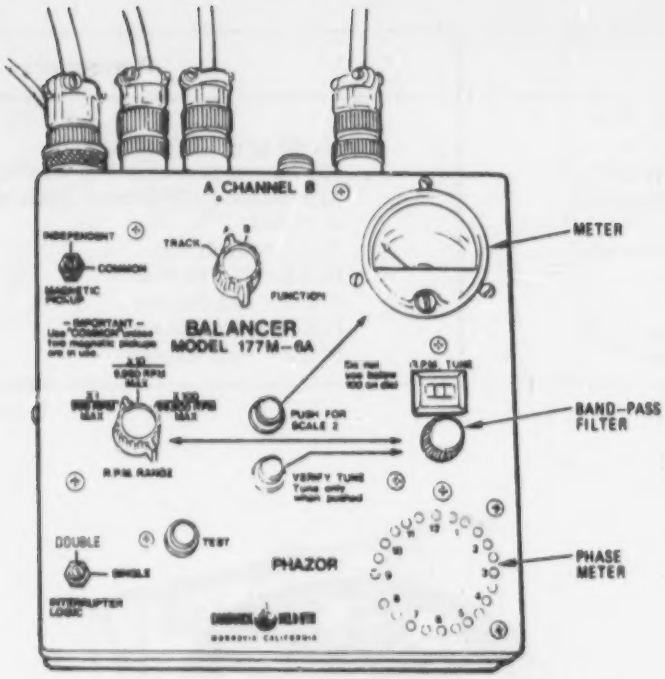


Figure 1-2. Balancer/Phazor 177M6A

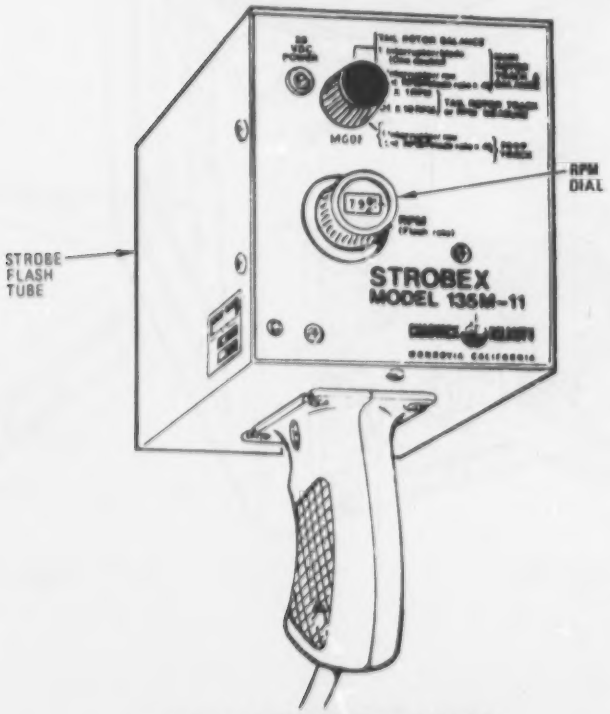


Figure 1-3. Strobex Tracker 135M11

Table 1-2. Leading Particulars

Item	Characteristic
Input power	+25 to +34 vdc (from aircraft)
Power consumption	100 watts maximum at +28 vdc (3.3 amps nominal)
Flash tube output	Approximately 2000 beam candle seconds per flash at 15 feet
Flash tube strobe rate	POS A = 60 Hz max POS B = 42.2 Hz max POS C = 16.6 Hz max POS D = 166.6 Hz max POS E = 1666 Hz max

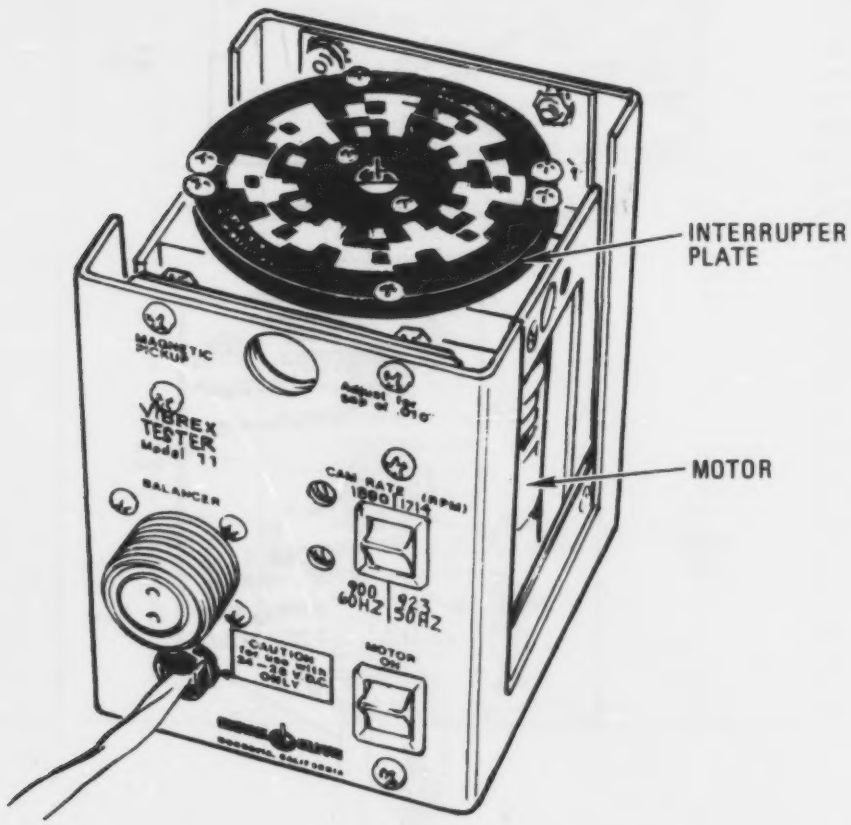
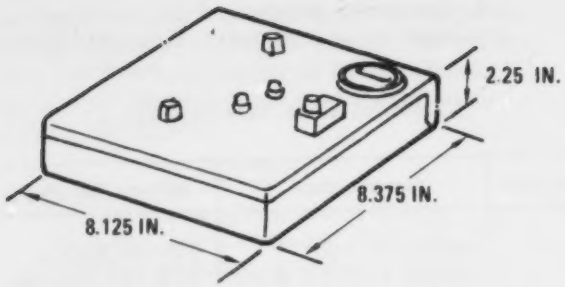
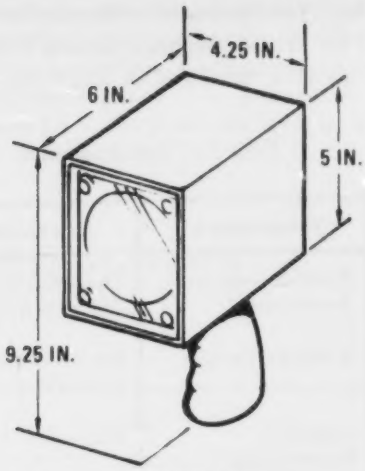


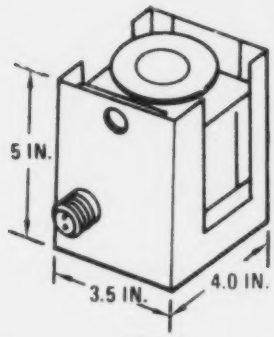
Figure 1-4. VIBREX Tester 11



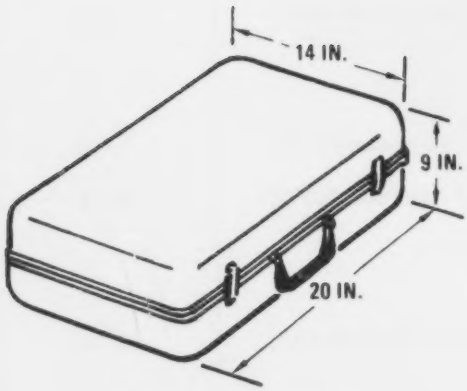
BALANCER/PHAZOR
(4 LBS.)



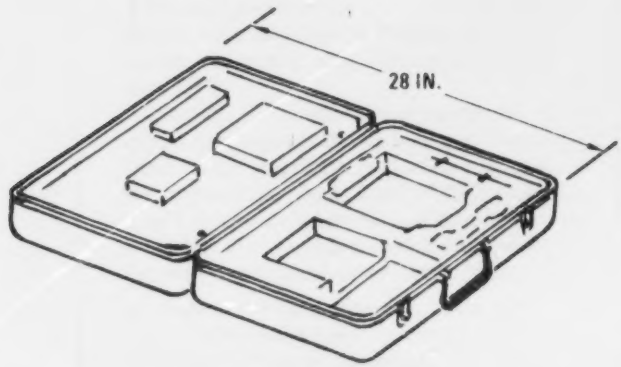
STROBEX
(5 LBS.)



TESTER
(3.5 LBS.)



CARRYING CASE (CLOSED)
(5 LBS.)



CARRYING CASE (OPEN)

Figure 1-5. VIBREX Dimensions

Section III. TEST EQUIPMENT, SPECIAL TOOLS, AND MATERIALS

1-5. Test Equipment and Special Tools. Table 1-3 contains a list of test equipment required to service the VIBREX. Equivalent items may be used if the recommended equipment is not available. There are no special tools required.

1-6. Consumable Materials. Table 1-4 contains a list of consumable materials required to service the VIBREX.

Table 1-3. Test Equipment

Nomenclature	Part Number
Function Generator (two required)	TEK MODEL FG502 NSN 6625-01-010-6783
Electronic Counter	Hp, Model 5345A NSN 4931-01-040-1496
Probs 10:1 (two required)	Tektronic P/N
Digital Multimeter	Hp, Model 3490A NSN 6625-01-040-9255
Power Supply (28 vdc)	NJE Corp, Model CS 36CR30 NSN 4931-00-962-2133
Oscilloscope/sys Display Graphical	Tektronic, Model 5440 NSN 6625-01-034-3269

Table 1-4. Consumable Materials

Item Number	Nomenclature	Military Specification
1	Solvent, Stoddard	P-D-680, Type II
2	Enamel, Lusterless Black	TT-E-527, Color No. 37038 per FED-STD-595

CHAPTER 2
OPERATING INSTRUCTIONS

2-1. General. This chapter provides complete operating instructions for the VIBREX. Included are illustrations and functional descriptions of all controls and indicators, operating procedures, and the use of balance and tracking charts. Troubleshooting techniques for the isolation of malfunctions, other than tracking and balancing rotor blades, are also discussed.

CAUTION

Extreme care should be exercised when using the VIBREX test set. This unit contains delicate electronic components and assemblies which may be easily damaged if subjected to physical abuse due to improper handling.

2-2. Controls and Indicators. Figure 2-1 and table 2-1 illustrates and describes the controls and indicators for the Balancer, figure 2-2 and table 2-2 illustrates and describes the controls and indicators for the Strobex, and figure 2-3 and table 2-3 illustrates and describes the controls and indicators for the Tester

Table 2-1. Balancer Controls and Indicators

Figure & Index No.	Control/Indicator	Function
2-1-1	FUNCTION 3-position switch	CHANNEL A accelerometer typically used to measure lateral one-per-revolution for main rotor balance. CHANNEL B accelerometer typically used to measure vertical one-per-revolution for main rotor track adjustment. Also used for tail rotor balancing. TRACK connects Magnetic Pickup signal to trigger Strobex.
2-1-2	IPS meter	Reads vibration amplitude in IPS. Scale no. l reads 0 to 1.0 IPS. Scale no. 2 reads 0 to 10.0 IPS.
2-1-3	PUSH FOR SCALE 2 pushbutton	Divides IPS meter reading by 10. IPS meter reads 0 to 10.0 IPS.
2-1-4	RPM TUNE dial	Tunes band-pass filters to the exact rotor RPM.
2-1-5	VERIFY TUNE pushbutton	Switches the filter from normal to sharp peak configuration.
2-1-6	PHAZOR ring-of-lights	A phase meter that measures the phase, or clock angle, between the rotor azimuth angle derived from the Magnetic Pickup inputs and the Accelerometer. Also serves as power indicator light.
2-1-7	TEST pushbutton	Disconnects the Accelerometer inputs and applies the Magnetic Pickup inputs to Phazor.
2-1-8	INTERRUPTER LOGIC switch	The SINGLE position is used when only one Interrupter is installed. The DOUBLE position is used if the swashplate has one Interrupter per blade, one of which is double to provide the one-per-revolution azimuth reference.
2-1-9	RPM RANGE 3-position switch	X1 range is 999 RPM range maximum, X10 range is 9,990 RPM range maximum, and X100 is 99, 900 RPM range maximum.
2-1-10	MAGNETIC PICKUP switch	COMMON connects the two Magnetic Pickup inputs together so that both Accelerometer inputs are referenced to the same Magnetic Pickup pulse from the fixed swashplate. The INDEPENDENT position is used only if two Magnetic Pickups are used, as on the left and right propellers of an airplane.

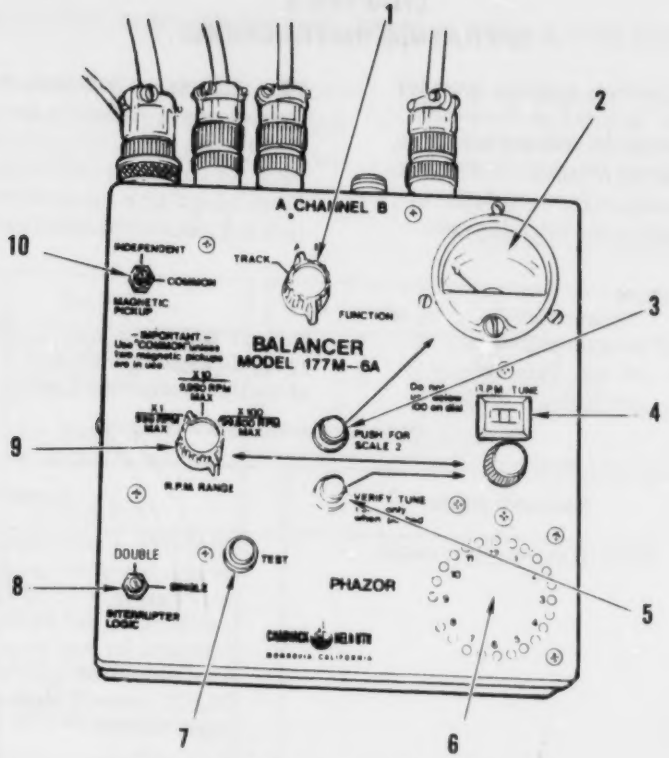


Figure 2-1. Balancer Controls and Indicators

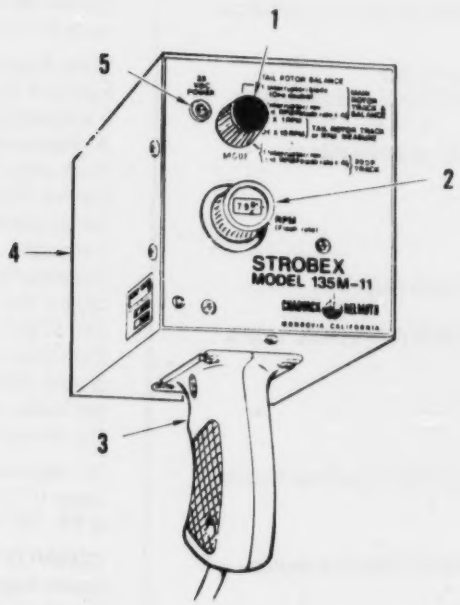


Figure 2-2. Strobex Controls and Indicators

Table 2-2. Strobex Controls and Indicators

Figure & Index No.	Control/Indicator	Function
2-2-1	MODE 5-position switch	*Position A* is used to operate the unit in a slave mode for main rotor tracking and tail rotor balancing. *Position B* is used for main rotor tracking. It incorporates a locking oscillator that, while locked to rotor rate by Magnetic Pickup pulses, causes the Strobex to flash at one-per-blade rate. *Position C* incorporates a free running oscillator to flash the Strobex at a maximum rate of 1000-per-minute for speed (RPM) measuring. *Position D* is also a free running oscillator that flashes the Strobex at a maximum rate of 10,000 per minute for tail rotor tracking and speed (RPM) measurements. *Position E* activates a locking oscillator as in position B, but operates at a flash rate of 10,000 flashes per minute. Primarily used to track airplane propellers.
2-2-2	RPM dial	Controls the flash rate of the Strobex in all positions except A.
2-2-3	TRIGGER switch	Turns the +28 vdc power ON and OFF.
2-2-4	FLASH TUBE	In its precision parabolic reflector, produces a high intensity collimated beam. The reflective targets on the blade tips or rotor grips are clearly visible under all outdoor weather conditions.
2-2-5	28 VDC POWER indicator	Lights when the TRIGGER switch is in the ON position.

Table 2-3. Tester Controls and Indicators

Figure & Index No.	Control/Indicator	Function
2-3-1	Double Interrupter	Screws on edge of rotor disc serve as interrupters. Double interrupter configuration is shown. Removal of four screws converts disc to single interrupter configuration.
2-3-2	RPM switch	Switch for high and low cam rate (RPM).
2-3-3	MOTOR ON switch	Switch for dc to motor.
2-3-4	CAM RATE (RPM) trim pots	Trim pots for precise adjustments of RPM.
2-3-5	Strobe disc	Strobe disc pattern on rotor disc shows a stopped image, under ordinary fluorescent room lights, when RPM is accurately adjusted.

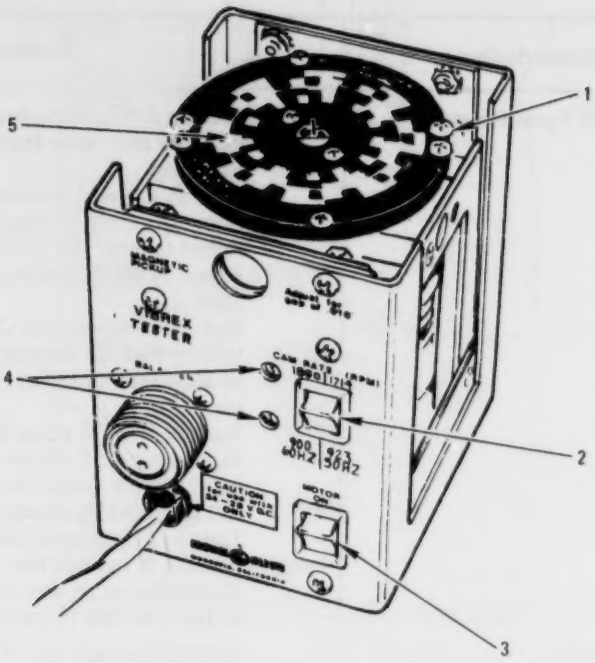


Figure 2-3. Tester Controls and Indicators

2-3. Rotor Vibration. The purpose of balancing and tracking a rotor is to reduce the vibration induced by the out-of-balance rotor. In general, main rotor vibrations are in a frequency range of 3 to 8 Hz and, because of this low vibration rate and fairly low forces, are not terribly damaging to the airframe. However, due to the low frequency range, this type vibration causes great discomfort to the aircrew. In contrast, tail rotor vibrations are much faster; i.e., 20 to 60 Hz. This frequency range causes relatively little discomfort to the aircrew but results in greater damage to the airframe. This is evident in terms of skin cracks, loose rivets, worn bearings and rod ends, pitch case bearings, etc. Vibration can generally be reduced to four sources:

a. One-per-revolution lateral vibration in the plane of the rotor disc is induced by improper weight distribution around the center of rotation. This is correctable by adding or subtracting weights at specific locations, or by sweeping the blades.

b. One-per-revolution vibration perpendicular to the plane of the main rotor disc is induced by a faulty track condition and is corrected by pitch link and/or tab adjustment.

c. Multiples of one-per-revolution vibrations are generally induced by aerodynamic forces, but are not correctable by track or weight changes.

d. Vibratory forces are caused by shafts and accessories which are out-of-balance or out of alignment.

2-4. Tuning the Balancer. The following paragraphs describe the use of the VIBREX in performing actual vibration measurements. Figure 2-4 illustrates the relationship of the Balancer to airframe mounted components.

a. The heart of the Balancer is its tuneable electronic band-pass filter. The Accelerometer generates an electrical signal which is representative of all the mechanical motion (vibration) of the point to which it is attached. To derive a useful signal, all of the signal except that from the one-per-revolution of the rotor being worked, must be rejected. When properly tuned, the filter passes only the signal at the RPM indicated by the Balancer's RPM RANGE switch and RPM TUNE dial, and rejects all other vibration frequency rates.

b. In use, the Balancer is tuned by adjusting the RPM TUNE dial until there is no change observed in clock angle (Phazor or Strobex) whether the VERIFY TUNE button is pushed or released. Pushing the VERIFY TUNE button switches the filter to its narrow mode, from stagger-tuned, or board, with button released. If the filter is not properly tuned, a difference in phase shift through the filter, from normal to stagger-tuned will be seen as a sharp change in clock angle, either in the ring-of-lights,

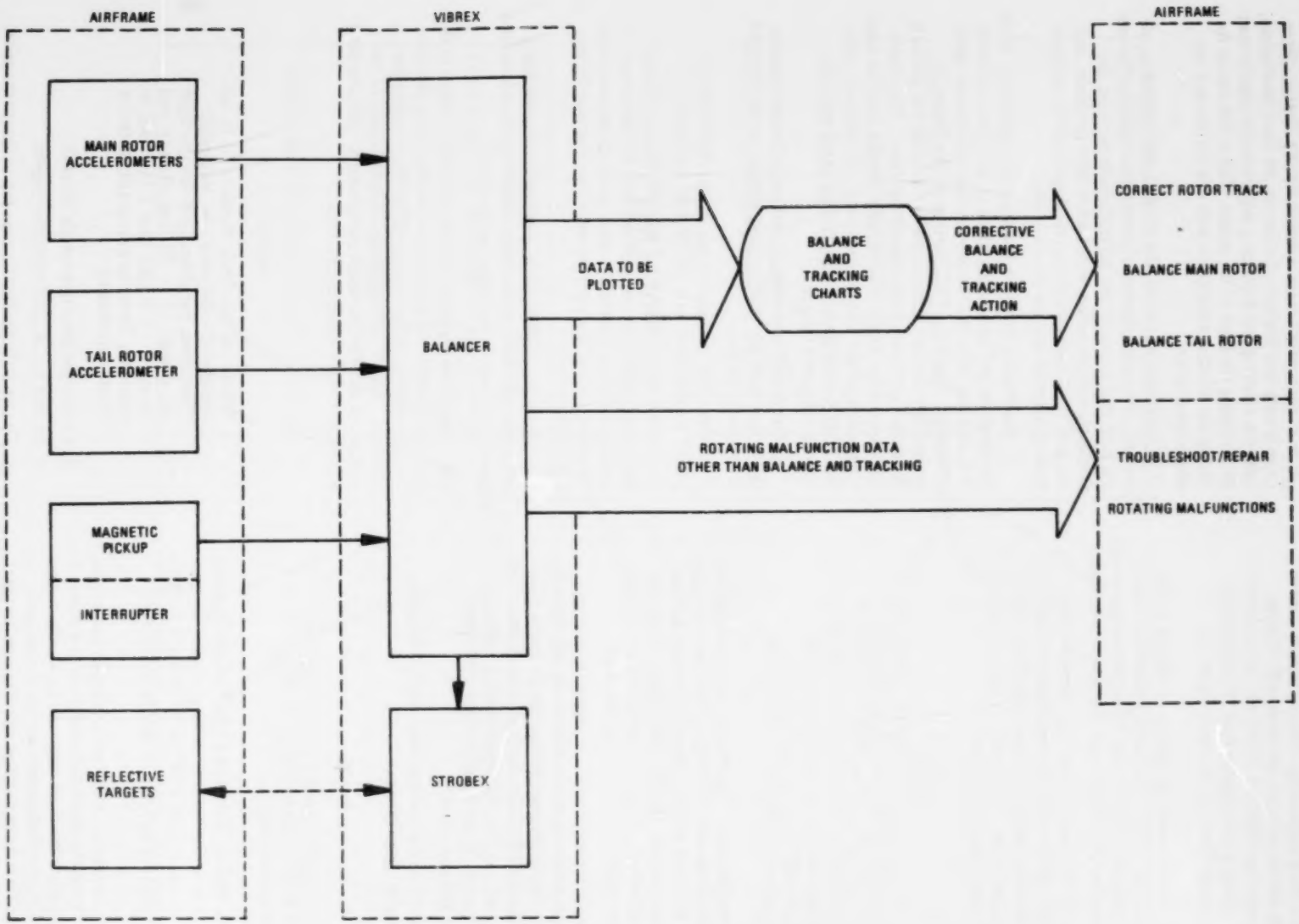


Figure 2-4. VIBREX/Airframe Interface

or the Strobex clock angle image. When properly tuned, no phase shift will be seen; i.e. no clock angle change will be seen when the VERIFY TUNE button is pushed or released. Typical phase relationships for improperly and properly tuned filters are shown in figure 2-5.

c. Further, there should be little or no change in IPS whether the VERIFY TUNE button is pushed or released. This should always be checked, but the actual tuning should be accomplished by adjusting for no change in clock angle.

d. Because of the lower circuit time constants, the VERIFY TUNE button must be pressed and released for longer intervals when working at low rotor RPM (4 or 5 seconds) for main rotors. Conversely, it may be worked more rapidly when doing tail rotors.

NOTE

Adjust RPM TUNE only while VERIFY TUNE button is pushed. The brief tuning instructions on the Balance Charts are carefully worded. Follow them exactly and you will find it an easy and effective process.

2-5. Use of the Balancer. The Phazor section of the Balancer is a phase meter with a display in the form of a ring of 24 lights. It is used with the Balancer to read the location of imbalance of main rotors. The ring-of-lights indicate clock angle which, along with the IPS meter reading, determines the point to be plotted on the chart.

a. The Phazor section derives its inputs (Magnetic Pickup pulse, and filtered Accelerometer signal), from the Balancer. The user observes which of the 24 lamps is lit and reads the hour or half-hour as from a clock face. This indication is used when working main rotors, for establishing a clock angle on the Balance Chart. The IPS is read from the Balancer meter.

b. The Strobex is used as the phase meter when measuring clock angle of tail rotors.

NOTE

When using the Strobex to determine the clock angle of the tail rotor, the Phazor lights are not used.

c. The only Phazor controls is a TEST pushbutton to verify that it is receiving the correct Magnetic Pickup pulses for phase reference, and a DOUBLE/SINGLE INTERRUPTER LOGIC switch to set the correct interrupter logic.

d. The Phazor requires a one-per-revolution pulse from the Magnetic Pickup on the fixed swashplate as a phase reference to measure the clock angle of the Accelerometer signal. However, most helicopters are fitted with one Interrupter per blade so as to trigger the Strobex for tracking. This causes the Magnetic Pickup to deliver two pulses per revolution which is not suitable for the Phazor. Since there is only one Magnetic Pickup on the fixed swashplate, both the tracking and balancing requirements must be met by arranging the logic of the pulses. This is the reason for fitting the rotating swashplate with one double and one single interrupter.

e. Once-per-revolution, the Strobex sees triggering pulses, one of which is double. Time constants in the Strobex are such that it cannot see the difference between the double and single pulses, so it flashes once per blade, and the two Tip Targets are displayed at each of the two positions in azimuth around the rotor disc.

f. The Phazor, however, has logic that looks only at the double pulse and ignores the single pulse. Thus, it thinks it is receiving only the one-per-revolution reference signal it requires. When the TEST button on the Phazor is pushed, the Accelerometer input is disconnected and only the Magnetic Pickup pulse train is admitted. The double pulse causes the 12:00 o'clock lamp to light, and the single pulse will light the 6:00 o'clock lamp. In summary, with the TEST button pushed, the 12:00 o'clock and 6:00 o'clock lights will be seen.

g. The display described in paragraph f must appear in the Phazor with the TEST button pushed, or the VIBREX is not ready for use.

h. To realize the above logic, the INTERRUPTER LOGIC switch must be in the DOUBLE position.

i. After application of the Magnetic Pickup pulses to the Phazor, several seconds are required for the circuit to stabilize. Failure to stabilize after 10 to 20 seconds could be caused by improper gap between the Magnetic Pickup and Interrupters.

j. When the TEST button is released, only one lamp will be lit, and that one is in response to the Accelerometer signal, so it may be anywhere on the clock.

2-6. Use of the Strobex. The Strobex has a trigger in the pistol-grip handle for dc power switching, a five-position function switch, and a ten-turn RPM dial to adjust the flash rate. Figure 2-4 illustrates the relationship of the Strobex to airframe mounted components. Observe steps a through c when using the Strobex.

NOTE

Focus on the flash focus tube in its parabolic reflector is essential. Therefore, periodically shine the light on a wall 10 to 20 feet distant and check for a bright spot 1 to 2 feet in diameter. Refer to paragraph 3)10c for focus adjustment.

a. Be sure the lamp is correctly focused.

b. Be sure to use clean reflective targets.

c. Be sure to look directly over top of lamp (the reflected light comes back to the light source).

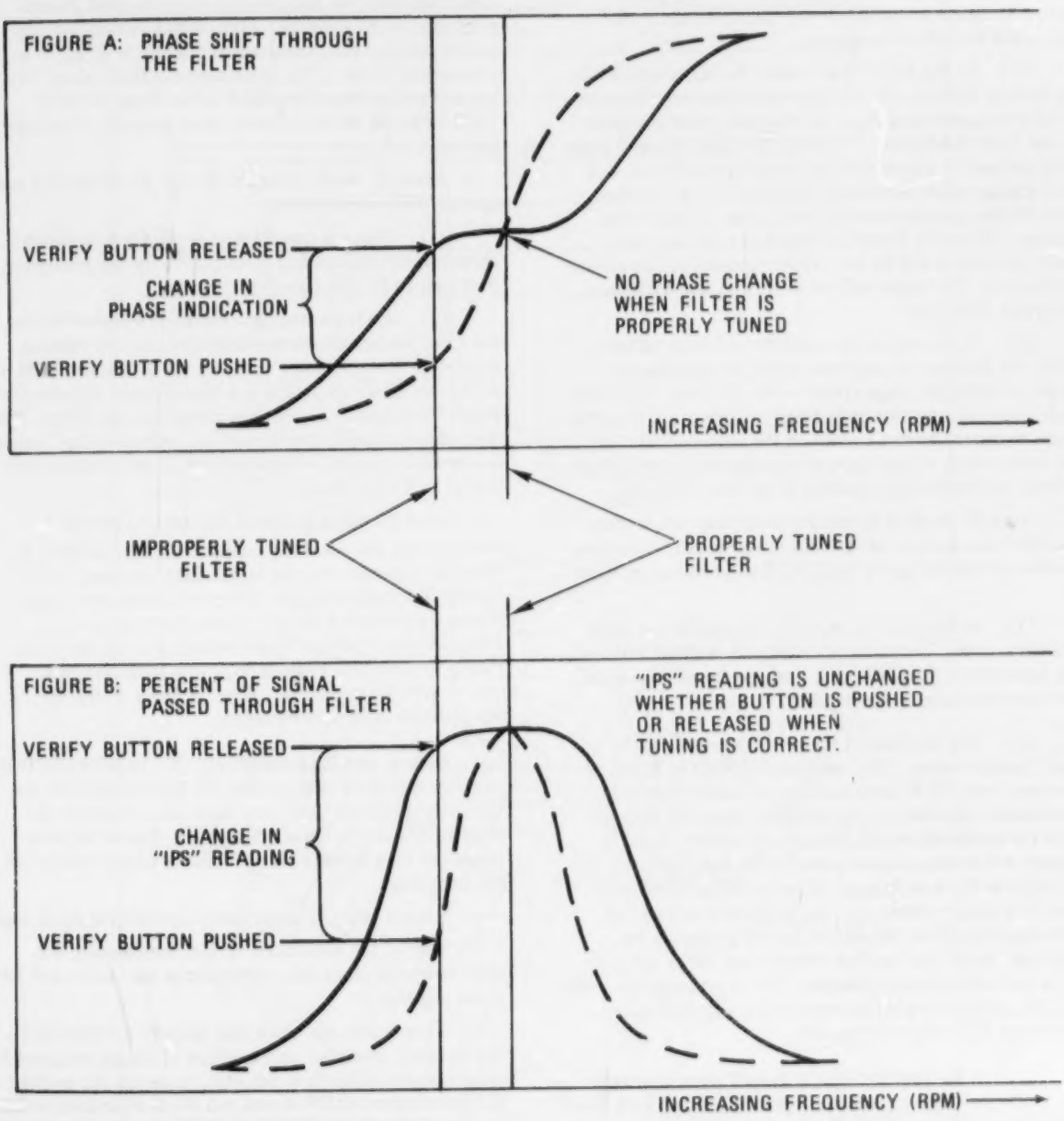


FIGURE A: PHASE SHIFT THROUGH THE FILTER
VERIFY BUTTON RELEASED
CHANGE IN PHASE INDICATION
VERIFY BUTTON PUSHED
NO PHASE CHANGE WHEN FILTER IS PROPERLY TUNED
INCREASING FREQUENCY (RPM)
IMPROPERLY TUNED FILTER
PROPERLY TUNED FILTER
FIGURE B: PERCENT OF SIGNAL PASSED THROUGH FILTER
"IPS" READING IS UNCHANGED WHETHER BUTTON IS PUSHED OR RELEASED WHEN TUNING IS CORRECT.
VERIFY BUTTON RELEASED
CHANGE IN "IPS" READING
VERIFY BUTTON PUSHED
INCREASING FREQUENCY (RPM)

Figure 2-5. Phase Relationships for Improperly and Properly Tuned Filters

2-7. Strobex Modes of Operation. The mode of operation depends on the rotor being balanced (main or tail), the number of Interrupters, number of rotor blades, and speed of rotors. The following paragraphs discuss the criteria for mode selection.

a. Mode A. Mode A is used for main rotor track, where the helicopter is fitted with one interrupter-per-blade, and for tail rotor balance.

(1) In this mode, the Strobex is a slave only flashing once in response to each external command. The electrical commands come from the Magnetic Pickup secured to the fixed swashplate. One interrupter-per-blade of magnetic material is attached to the rotating swashplate, and each passage of an Interrupter, in proximity to the Magnetic Pickup, generates an electrical pulse to trigger the Strobex. When the Strobex is directed at the tip path, both Tip Targets will be seen, superimposed, at two points in azimuth. The targets will be seen front and back on a two-blade helicopter.

(2) This mode is also used for tail rotor balancing where the Balancer, in response to the Accelerometer signal, provides the trigger pulse to the Strobex. The clock angle observed, together with vibration amplitude from the Balancer meter, defines a point on the Balance Chart for the rotor, which in turn, indicates corrective action. When in Mode A, the Strobex operates at its lower intensity.

b. Mode B. Mode B is used for main rotor track when the helicopter is fitted with one interrupter-per-revolution, or when a brighter light is required than provided by Mode A.

(1) In Mode B, the Strobex operates in a locking oscillator mode. The rotating swashplate is fitted with only one Interrupter, thus delivering a one-per-revolution pulse (not one-per-blade) to the Strobex.

(2) The oscillator is set by the ten-turn dial to flash once-per-blade. (The ten-turn dial is set to equal, or less than, rotor RPM times number of blades times 0.4). The one-per-revolution signal from the Magnetic Pickup locks (or resets) the oscillator each revolution. The Tip Targets will be seen superimposed, at as many azimuth positions as there are blades. However, if the RPM dial is set to a slightly lower rate, the blades will still be seen at the same position, but will be spread uniformly for each resolution. The locking pulse always keeps the target in the same azimuth position. This is typically used on five, six, or seven blade helicopters where superimposed targets are difficult to distinguish.

(3) If the brighter light is desired when working the smaller helicopters, which are generally fitted with one interrupter-per-blade, Mode B is used. Simply set the flash rate to the blade rate, times 0.4, or slightly less, and the remaining operation is identical to Mode A except the light is about four times greater. The tip pattern cannot be spread in Mode A because the Interrupters restart the oscillator each time a blade passes, and the oscillator never fires the Strobex. By setting the ten-turn dial to double the blade rate (use a multiplier of 0.8 instead of 0.4), the tip pattern can be seen at twice as many points in azimuth. When in Mode B, the Strobex operates at its higher intensity.

c. Mode C. Mode C is used for speed RPM measurement, activates the free-running oscillator, and disconnects any external signals. Flash rate is controlled only by the ten-turn dial, which reads directly in RPM, to an accuracy of about ±2%. Its maximum flash rate is 1000 per minute for measuring RPM in the range of 100 to 1000 RPM. In Mode C, the Strobex operates at its higher intensity.

d. Mode D. Mode D is used for tail rotor tracking and speed (RPM) measurement.

(1) This is a free-running oscillator as in Mode C. However, the dial reading is multiplied by ten generating a flash rate to 10,000 flashes per minute.

(2) Since no Magnetic Pickup is attached to the tail rotor, tracking is accomplished by the free-running oscillator. For two and four blade tail rotors, the RPM is set to four times rotor rate and fine adjusted to cause the single Tip Target to appear as a stopped image of four. The rotor disc is viewed edge-on and the reflective Tip Targets are viewed for track. When in Mode D, the Strobex operates at its lower intensity.

e. Mode E. Mode E is used for tracking propellers. Mode E activates a locking oscillator exactly as Mode B, except it operates over the higher flash rate range to 10,000 flashes per minute. It is used primarily to track airplane propellers where the flash rate is set to three times propeller rate (for three blades), and the Magnetic Pickup, pulsed by a single Interrupter, locks the oscillator at one-per-revolution. When in Mode E, the Strobex operates at its lower intensity.

2-8. Balance and Tracking Charts. The Balance Charts are computers that are used to plot the measurement of the vibration amplitude and clock angle and determine the weights required to balance the rotor. Figure 2-6 illustrates a typical Balance Chart. Balance Charts consists of the following:

a. A clock face (12 radial lines) representive clock angle.

b. A set of ten concentric circles, representing IPS, drawn over the clock face, with zero at the center and 1.0 at the outside.

c. A graph over the clock face and IPS circles to indicate amount, direction, and location of change required to weight, sweep, pitch link, tab, etc., to correct the problem. The intersection of IPS circles and clock angle lines define a point on the chart. From this point, lines to the axes of a graph show the amount and location of weights (or main rotor sweep) required to accomplish balance, or pitch link change to accomplish track.

2-9. Reading the Charts. Reading the charts is about the same, whatever the geometry of the rotor represented.

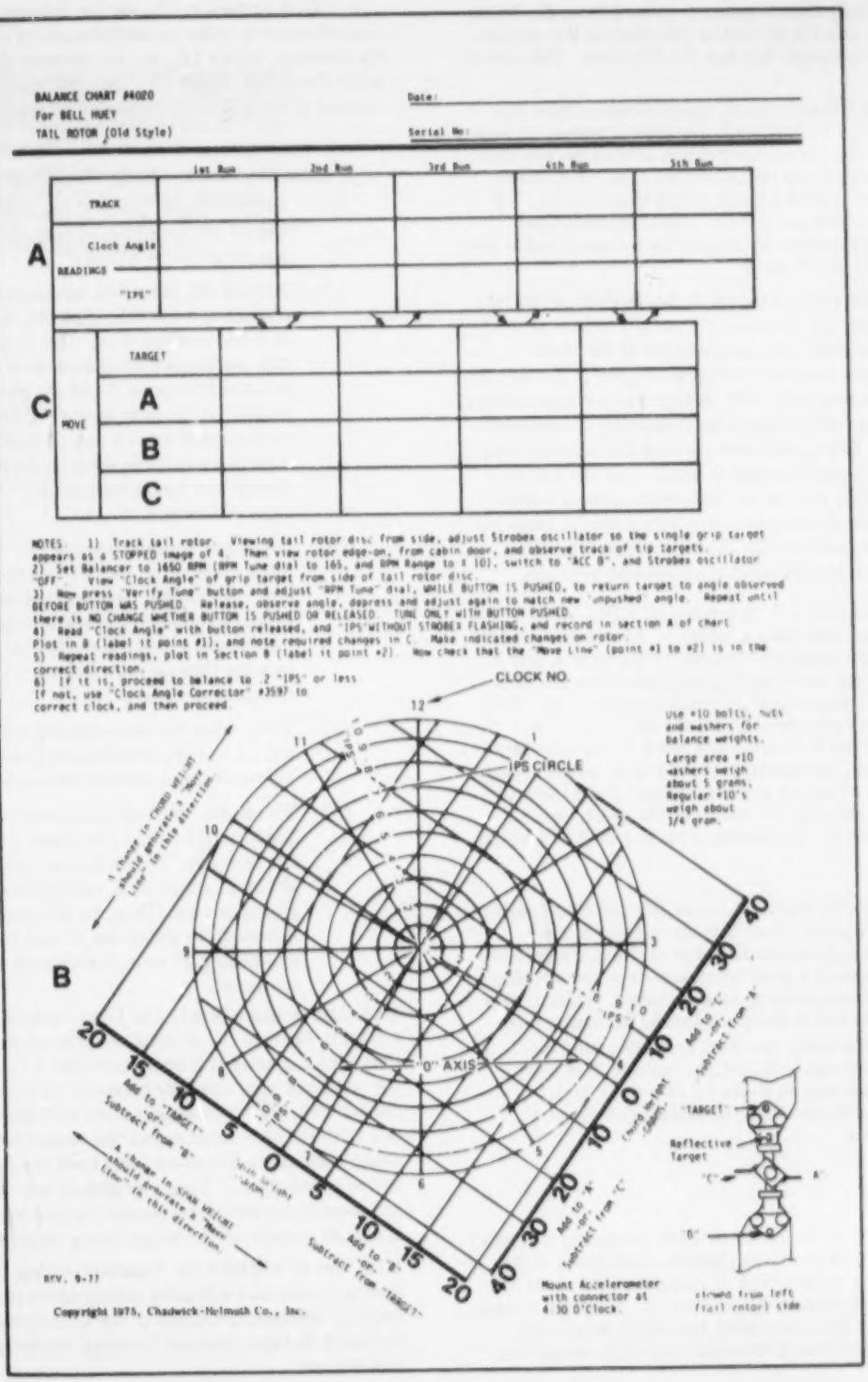

BALANCE CHART #4020
For BELL HUEY
TAIL ROTOR (Old Style)
Date:
Serial No:
1st Run
2nd Run
3rd Run
4th Run
5th Run
A
TRACK
Clock Angle
READINGS
"IPS"
C
MOVE
TARGET
A
B
C
NOTES: 1) Track tail rotor. Viewing tail rotor disc from side, adjust Strobex oscillator so the single grip target appears as a STOPPED image of 4. Then view rotor edge-on, from cabin door, and observe track of tip targets.
2) Set Balancer to 1650 RPM (RPM Tune dial to 165, and RPM Range to X 10), switch to "ACC B", and Strobex oscillator "OFF". View "Clock Angle" of grip target from side of tail rotor disc.
3) Now press "Verify Tune" button and adjust "RPM Tune" dial, WHILE BUTTON IS PUSHED, to return target to angle observed BEFORE BUTTON WAS PUSHED. Release, observe angle, depress and adjust again to match new "unpushed" angle. Repeat until there is NO CHANGE WHETHER BUTTON IS PUSHED OR RELEASED. TUNE ONLY WITH BUTTON PUSHED.
4) Read "Clock Angle" with button released, and "IPS" WITHOUT STROBEX FLASHING, and record in section A of chart. Plot in B (label it point #1), and note required changes in C. Make indicated changes on rotor.
5) Repeat readings, plot in Section B (label it point #2). Now check that the "Move Line" (point #1 to #2) is in the correct direction.
6) If it is, proceed to balance to .2 "IPS" or less. If not, use "Clock Angle Corrector" #3597 to correct clock, and then proceed.
CLOCK NO.
12
1
2
3
4
5
6
7
8
9
10
11
IPS CIRCLE
"0" AXIS
B
20
15
10
5
0
5
10
15
20
40
30
20
10
0
10
20
30
40
Use #10 bolts, nuts and washers for balance weights.
Large area #10 washers weigh about 5 grams; Regular #10's weigh about 1/4 gram.
"TARGET"
Reflective Target
"C"
"B"
A
Mount Accelerometer with connector at 4:30 O'Clock.
(Viewed from left (tail rotor) side
REV. 9-77
Copyright 1975, Chadwick-Helmuth Co., Inc.

Figure 2-6. Typical Balance Chart

a. First, using the information derived from the Balancer/Phazor, a point is plotted on the chart at the intersection of the clock angle line and the IPS circle. The point is labeled no. 1.

b. If the IPS reading is off scale (vibration level too high) The PUSH FOR SCALE 2 button is pushed to take the reading. Then when the point is plotted on the chart, the IPS reading should be divided by 2, or 10, or some number that will yield a result of less than 1.0; i.e., 1.8 IPS might be plotted at 0.9 etc. Then, the indicated weight changes must be multiplied by the same factor previously used (2 or 10, etc.)

c. From this point, lines are drawn to each of the two axes of the chart to determine the weight change required for balance, or pitch link change required for track. Change only one axis fro the first move (select the one farthest from the zero axis line). Additional readings are then taken, after corrective action, and replotted on the chart. The replotted line should now move to the zero axis line indicating no further changes is required to the axis to which the change was made. Now the indicated weight should be added to the other axis, which should move its plotline to the center of the chart, thus achieving final balance. This is illustrated in the following problem.

d. Refer to figure 2-7. A reading of 5:00 o'clock at 0.8 IPS is plotted on the chart as point 1. As can be seen, this calls for a weight addition of about 14 grams at A and 15 grams at B. Since the B reading is farther from the zero axis, we add 15 grams to B only and nothing to A. The next plot point is shown as 2 and should be at 7:15 o'clock, and about 0.35 IPS. The move line is now parallel to the arrow, corresponding to the span weight change. Now, addition of the 14 grams to A (chordwise) should move the plot point to the center of the chart, point 3, for perfect balance. In practice, a reading of 0.2 or better is acceptable.

2-10. Correction of Charts. Because IPS and clock angle, in response to a given out-of-balance condition, are a function of the mechanical response of the airframe, and since all airframes of a given helicopter type are not identical, there is some spread in measurements. Thus, it may be necessary to correct the chart for the particular rotor being worked. Normally, the chart correction used for hover balance will apply to in-flight balance. This will have to be determined on a case by case basis as Airframes exhibit different flight characteristics due to a variety of factors.

a. Weights. Differences in airframe sensitivity can cause the move line to be the wrong length. Correction of this error is relatively simple since the length of the move line is in direct proportion to the amount of the weight change, e.g., if the move line is too long, too much weight was added; if the move line is too short, too little weight was used.

b. Clock Angle. Clock angle error causes the chart to call for the weights in the wrong place (or in an incorrect ratio on a pair of points). A simple way to correct clock angle is to use the Balance Chart Clock Angle Corrector.

c. Clock Corrector. To use the Balance Chart Clock Angle Corrector, refer to the instructions contained on the envelope, figure 2-8, and the Balance Chart Clock Angle Corrector, figure 2-9. Detailed instructions are covered in the following balancing problem.

d. Balancing Problem Using Clock Angle Corrector.

(1) Refer to figure 2-10. If the chart and helicopter are not perfectly matched, the readings might be as follows:

(2) Assume the same first reading of 5:00 o'clock and 0.8 IPS. Add the same 15 grams at B and nothing at A. This time our second reading is 6:30 o'clock and 0.7 IPS as indicated by point 2 and the move line is not parallel to the span arrow. If we track back to the chord axis (A and C) it indicates that a change was made there; however, the change was not actually made. Therefore, there is a mismatch.

(3) Use Clock Angle Corrector No. 3597 and place eyelet A on the first reading and align index A-O in the direction the move line should have gone, and swing index A-B in the direction that the move line did go. We now see that we must subtract 1 hour from the clock numbers.

(4) Then, when the two readings are plotted (1 and 2) on the corrected chart, we see that the move line is now in the correct direction.

(5) We can also see that too much weight was added to B because plot point 2 is beyond the zero line. This indicates we need to add about 25 grams to A, rather than the 14 originally shown. Thus, by subtracting about 4 from B, to which the 15 had been added, and adding 25 to A, the balance should be corrected.

2-11. Use of Gram Scale. The Gram Scale is set up as shown in figure 2-11. If small weights are to be weighed (less than 5 grams), it is important that it be set up out of the wind and very carefully balanced by the screw foot at the left end. The balancing is done with the pan attached and both the slide balance and the vernier balance at 0. Small weights are measured using both the slide balance and vernier balance. Larger weights (5 grams or over) do not require the use of the vernier balance as the total range is a small percent of the weight being measured.

2-12. Use of VIBREX for Troubleshooting. The following procedures will assist maintenance personnel in locating vibration problems in the aircraft that are caused by faulty linkages, rod end bearings, dampers, transmission mounts, etc.

NOTE

Maintaining a record of imbalance amplitudes and their cause will greatly enhance troubleshooting procedures for like models of aircraft. Just because a component is inducing vibration do not assume the component is faulty. Check vibration levels on a "healthy" ship. Refer to applicable aircraft technical manual.

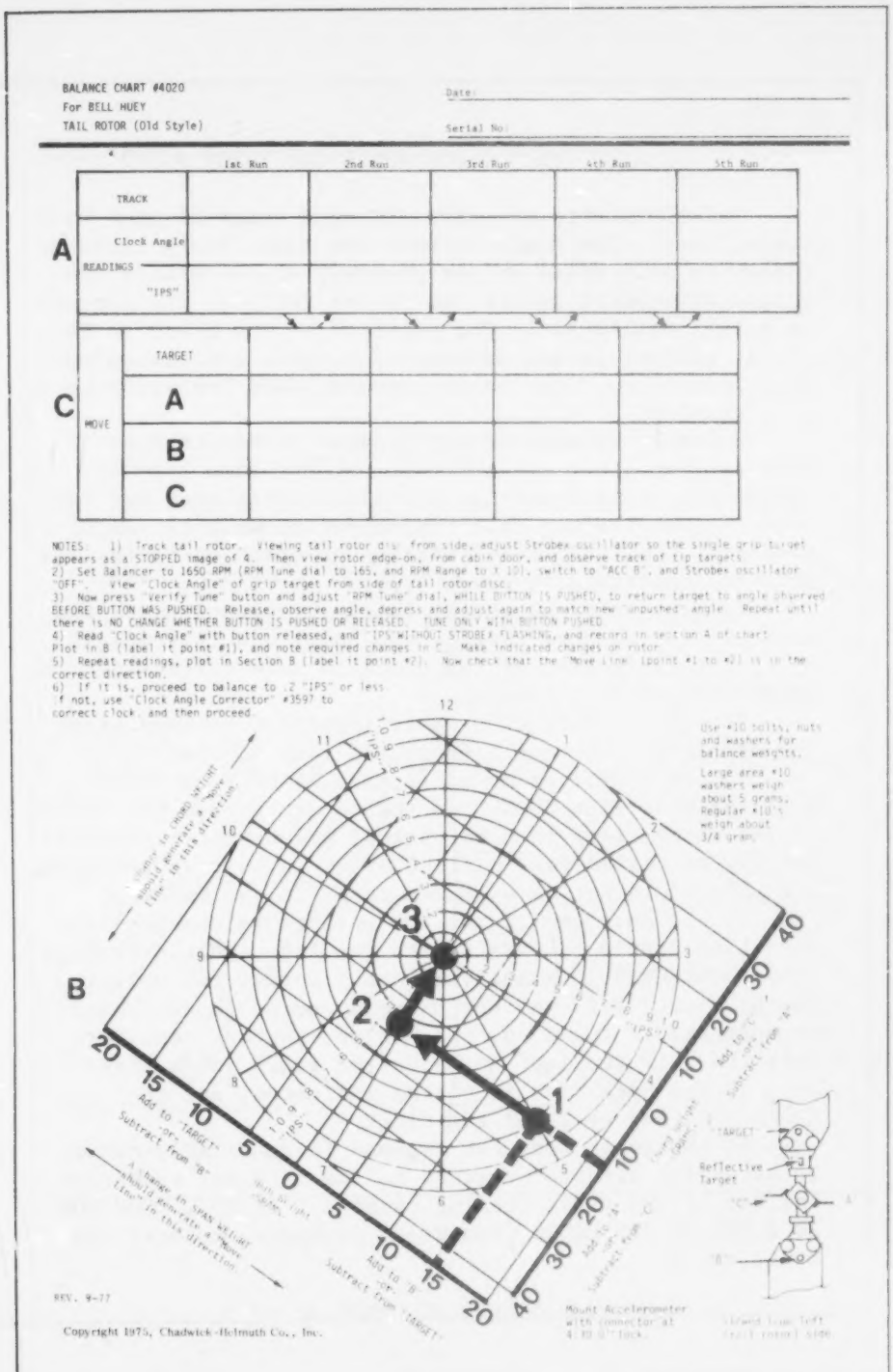

BALANCE CHART #4020
For BELL HUEY
TAIL ROTOR (Old Style)
Date:
Serial No:
1st Run
2nd Run
3rd Run
4th Run
5th Run
A
TRACK
Clock Angle
READINGS
"IPS"
C
MOVE
TARGET
A
B
C
NOTES: 1) Track tail rotor. Viewing tail rotor disc from side, adjust Strobex oscillator so the single grip target appears as a STOPPED image of 4. Then view rotor edge-on, from cabin door, and observe track of tip targets.
2) Set Balancer to 1650 RPM (RPM Tune dial to 165, and RPM Range to X 10), switch to "ACC B", and Strobex oscillator "OFF". View "Clock Angle" of grip target from side of tail rotor disc.
3) Now press "Verify Tune" button and adjust "RPM Tune" dial, WHILE BUTTON IS PUSHED, to return target to angle observed BEFORE BUTTON WAS PUSHED. Release, observe angle, depress and adjust again to match new "unpushed" angle. Repeat until there is NO CHANGE WHETHER BUTTON IS PUSHED OR RELEASED. TUNE ONLY WITH BUTTON PUSHED.
4) Read "Clock Angle" with button released, and "IPS" WITHOUT STROBEX FLASHING, and record in Section A of chart. Plot in B (label it point #1), and note required changes in C. Make indicated changes on rotor.
5) Repeat readings, plot in Section B (label it point #2). Now check that the "Move Line" (point #1 to #2) is in the correct direction.
6) If it is, proceed to balance to .2 "IPS" or less. If not, use "Clock Angle Corrector" #3597 to correct clock, and then proceed.
B
Use #10 bolts, nuts and washers for balance weights.
Large area #10 washers weigh about 5 grams. Regular #10's weigh about 3/4 gram.
Reflective Target
Mount Accelerometer with connector at 4:30 o'clock.
REV. 9-77
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Figure 2-7. Accurate Tail Rotor Check

BALANCE CHART CLOCK ANGLE CORRECTOR #3597

Balance charts are made for each rotor of each helicopter type. The angle between the axes (heavy lines at edges) is determined by the geometry of the available weight attachment points, as is the ratio of the amounts of weight called for. The rotation of the graph on the clock, and the actual amounts of weight, are determined experimentally. The charts represent the best average of many samples.

However, because of differences in manufacture or repairs, etc., not all airframes of the same type are identical. Differences in mechanical stiffness and resonant frequencies may call for different weights---AND DIFFERENT CLOCK ANGLE---(rotation of graph on clock) for some helicopters of a given type.

Correction of weight is fairly straightforward and obvious (if the Move Line is too long, use less weight, etc.) but correction of the clock is more difficult. The CORRECTOR makes it simple.

To use the CORRECTOR it is important to understand the direction the move line should take on the chart.

1) If a pair of moves is made EXACTLY as called for, the move line SHOULD go toward or through the center of the Chart. Keep in mind that if one weight is changed exactly as called for, but the other is only approximate, the Line would not be expected to go to the center.

2) If only one of the two weights is changed, the Move Line should be PARALLEL to the fine lines extending from the UNCHANGED axis. In other words, the weight on the second axis was not changed, so no change should be indicated. (On 3, 5, and 6 Blade Charts, consider only the "pie section" in which the first point lies.)

If the Move Line is not as indicated, use the CORRECTOR, and re-label the Clock.

If the rotor does not respond in an orderly manner to balancing efforts, restore to the original condition and see if the first reading repeats. IF NOT, LOOK FOR PROBLEMS IN THE ROTOR (Bearings, linkages, mounts, rod-ends, etc.).

Figure 2-8. Balance Chart Clock Angle Corrector Instructor Sheet

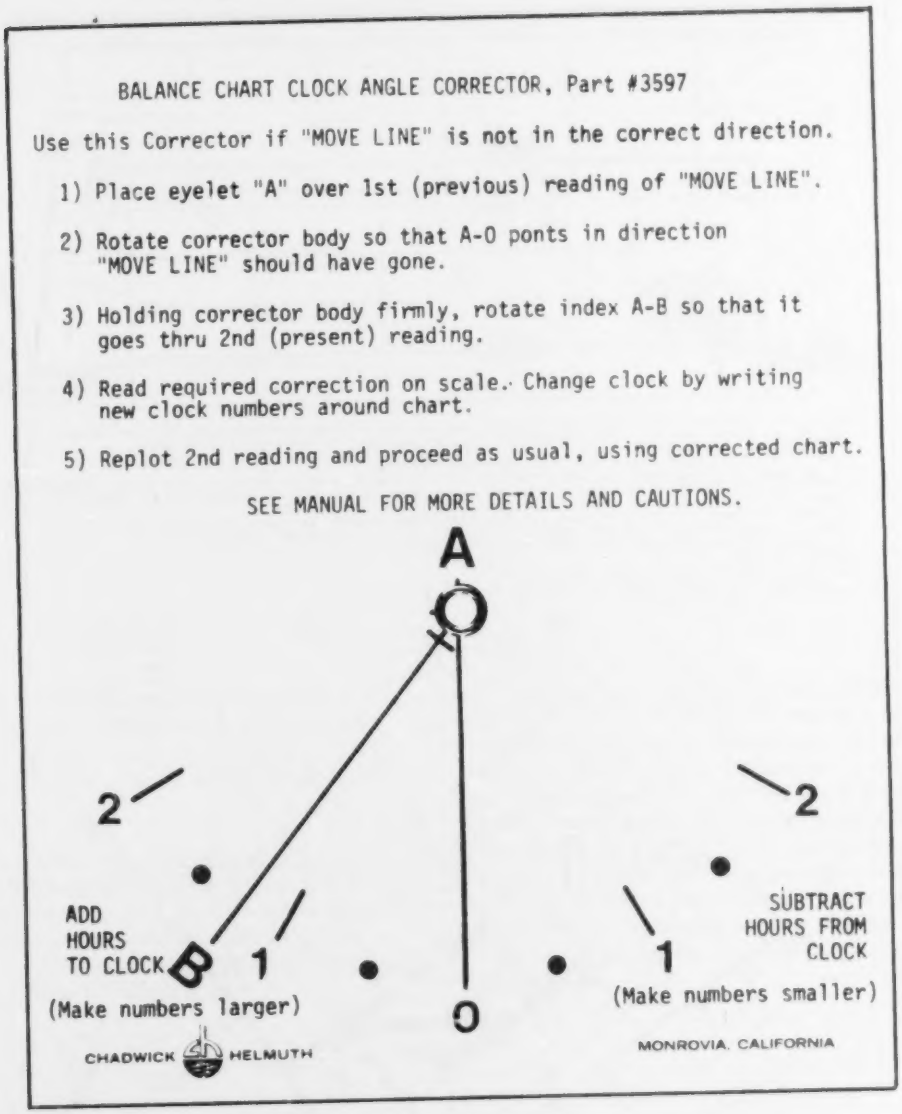

BALANCE CHART CLOCK ANGLE CORRECTOR, Part #3597
Use this Corrector if "MOVE LINE" is not in the correct direction.
1) Place eyelet "A" over 1st (previous) reading of "MOVE LINE".
2) Rotate corrector body so that A-O ponts in direction "MOVE LINE" should have gone.
3) Holding corrector body firmly, rotate index A-B so that it goes thru 2nd (present) reading.
4) Read required correction on scale. Change clock by writing new clock numbers around chart.
5) Replot 2nd reading and proceed as usual, using corrected chart.
SEE MANUAL FOR MORE DETAILS AND CAUTIONS.
A
2
ADD HOURS TO CLOCK
B
1
(Make numbers larger)
O
1
2
SUBTRACT HOURS FROM CLOCK
(Make numbers smaller)
CHADWICK HELMUTH
MONROVIA, CALIFORNIA

Figure 2-9. Balance Chart Clock Angle Corrector

BALANCE CHART #4020
For BELL HUEY
TAIL ROTOR (Old Style)

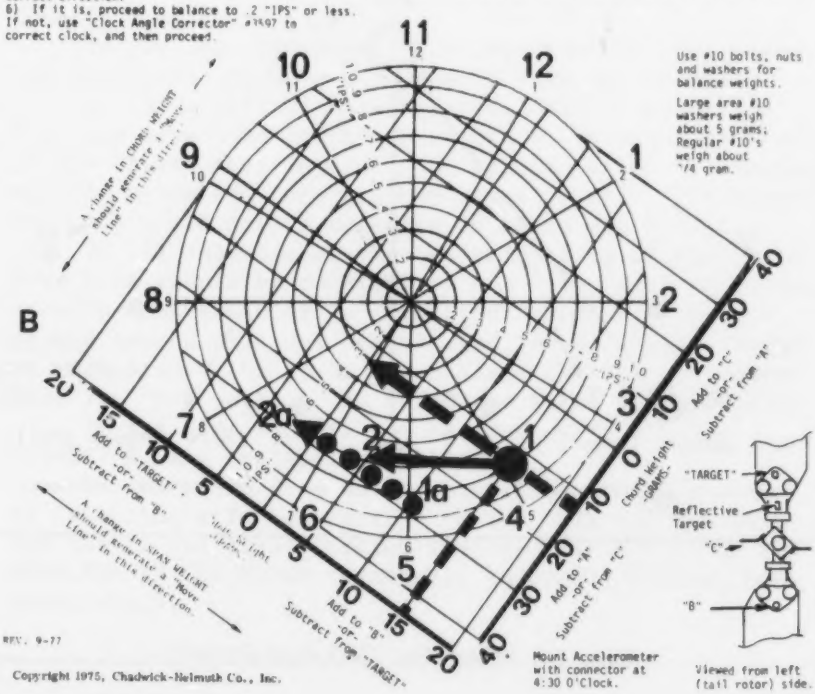
Date: _____

Serial No: _____

		1st Run	2nd Run	3rd Run	4th Run	5th Run
A	TRACK					
	Clock Angle					
	READINGS "IPS"					

C	MOVE	TARGET				
		A				
		B				
		C				

NOTES: 1) Track tail rotor. Viewing tail rotor disc from side, adjust Strobex oscillator so the single grip target appears as a STOPPED image of 4. Then view rotor edge-on, from cabin door, and observe track of tip targets.
2) Set Balancer to 1650 RPM (RPM Tune dial to 165, and RPM Range to X 10), switch to "ACC B", and Strobex oscillator "OFF". View "Clock Angle" of grip target from side of tail rotor disc.
3) Now press "Verify Tune" button and adjust "RPM Tune" dial, WHILE BUTTON IS PUSHED, to return target to angle observed BEFORE BUTTON WAS PUSHED. Release, observe angle, depress and adjust again to match new "unpushed" angle. Repeat until there is NO CHANGE WHETHER BUTTON IS PUSHED OR RELEASED. TUNE ONLY WITH BUTTON PUSHED.
4) Read "Clock Angle" with button released, and "IPS"WITHOUT STROBEX FLASHING, and record in section A of chart. Plot in B (label it point #1), and note required changes in C. Make indicated changes on rotor.
5) Repeat readings, plot in Section B (label it point #2). Now check that the "Move Line" (point #1 to #2) is in the correct direction.
6) If it is, proceed to balance to .2 "IPS" or less.
If not, use "Clock Angle Corrector" #3997 to correct clock, and then proceed.


B
A change in CHORD WEIGHT should generate a "Move Line" in this direction.
A change in SPAN WEIGHT should generate a "Move Line" in this direction.
Add to "TARGET" -or- Subtract from "B"
Add to "B" -or- Subtract from "TARGET"
Add to "A" -or- Subtract from "C"
Add to "C" -or- Subtract from "A"
Chord Weight -GRAMS-
"TARGET"
Reflective Target
"A"
"B"
"C"

Use #10 bolts, nuts and washers for balance weights.

Large area #10 washers weigh about 5 grams; Regular #10's weigh about ¼ gram.

Mount Accelerometer with connector at 4:30 O'Clock.

Viewed from left (tail rotor) side.

REV. 9-77

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Figure 2-10. Reclocked Chart

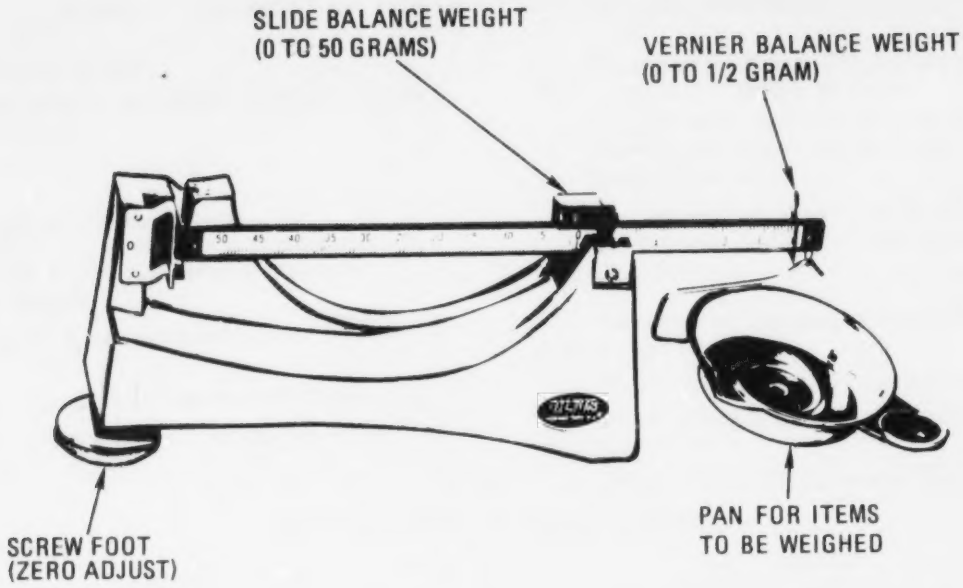

Figure 2-11. Gram Scale

a. When using the Balancer for troubleshooting, the object is to measure the vibration rate of the disturbance and then match it against known rotation rates or harmonics or multiples of known rotation rates in the helicopter.

b. The Balancer meter will read only if its filter is tuned to coincide with the frequency (vibration rate) of a disturbance being measured along the axis of the Accelerometer. Thus, if the IPS meter reads some vibration level, the Accelerometer must be generating a signal at the frequency at which the filter RPM TUNE dial is set.

c. When using the Balancer for troubleshooting, the Strobex need not be plugged in, making it easier to probe with the Accelerometer. Searching or scanning the frequencies with the RPM TUNE dial must be done slowly at the low RPM ranges (X1 on the RPM RANGE switch) and may be done more rapidly at the higher ranges (X10 and X100). Search with the VERIFY TUNE button released (broad, or stagger-tuned filter) and when the meter reads, push the VERIFY TUNE button (to the sharp filter position) and sharp tune for the maximum meter reading. In this manner, it is possible to read the vibration rate with an accuracy of about 2%.

CHAPTER 3
AVIATION UNIT MAINTENANCE INSTRUCTIONS

Section I. PREPARATION FOR USE, STORAGE, AND SHIPMENT

3-1. Preparation for Use. .

a. Upon receipt of the VIBREX, carefully open the shipping container.

NOTE

Retain the shipping container. The VIBREX may be damaged in shipping and, therefore, must be returned through proper channels.

b. Open the Carrying Case and perform the following checks:

(1) Check contents against packing slip.

(2) Check for obvious damage; i.e., dents, chips, cracks, etc.

3-2. Preparation for Storage. Use the following procedure when preparing the VIBREX for storage:

a. Place the Tester, Accelerometers, Magnetic Pickups, Brackets, and Cables in the top compartment of the Carrying Case (fig. 1-1).

b. Place the Balancer, Strobex, and Gram Scale in their proper compartments in the Carrying Case (fig. 1-1).

c. Close Carrying Case.

3-3. Preparation for Shipment. Perform all steps in paragraph 3-2 and the following:

a. Place Carrying Case in shipping container.

b. Record missing or damaged components on the appropriate forms.

c. Return VIBREX through proper channels.

Section II. OPERATIONAL CHECKOUT

NOTE

The VIBREX is performance checked and calibrated prior to leaving the factory. However, the following procedures should be performed to ensure that no damage to internal components has occurred during shipment.

3-4. Test Preparation. Perform the instructions in this section prior to actual use of the VIBREX. Personnel should become thoroughly familiar with the entire procedure before attempting the test.

CAUTION

Extreme care should be exercised when using the VIBREX test set. This unit contains delicate electronic components and assemblies which may be easily damaged if subjected to physical abuse due to improper handling.

a. Test Requirements. Testing of the following VIBREX items is required:

(1) Balancer

(2) Strobex

(3) Magnetic Pickup 3030AN

(4) Accelerometer 4177B

(5) Associated cables

NOTE

Testing of the VIBREX requires 24 to 30 vdc power source. This can be obtained from a battery, aircraft source or portable DC power supply of at least 3 amps minimum.

b. Test Setup. Refer to figure 3-1 for VIBREX test setup.

CAUTION

Ensure all cabling is correctly installed and equipment is connected to a stable 28 vdc source.

3-5. Balancer Checkout. Testing of all functions of the Balancer is accomplished by the Tester. If the following performance checks are not within specifications, perform paragraph 3-8 below to isolate if the Balancer unit is at fault.

a. Performance Checks.

(1) Install two Accelerometers and a Magnetic Pickup on the Tester as shown in figure 3-2. Screw Magnetic Pickup in until it just touches the interrupter screws. Then, back out about one flat (1/6 turn) to provide clearance. Tighten jam nut on pickup.

NOTE

The Magnetic Pickup must be very close because the small rotor diameter results in very low peripheral velocity.

(2) Connect Magnetic Pickup and Accelerometer Cables as shown in figure 3-2. Dress the Accelerometer Cables around behind the Tester so there is no force from the cables that might pull the cam followers away from the cam.

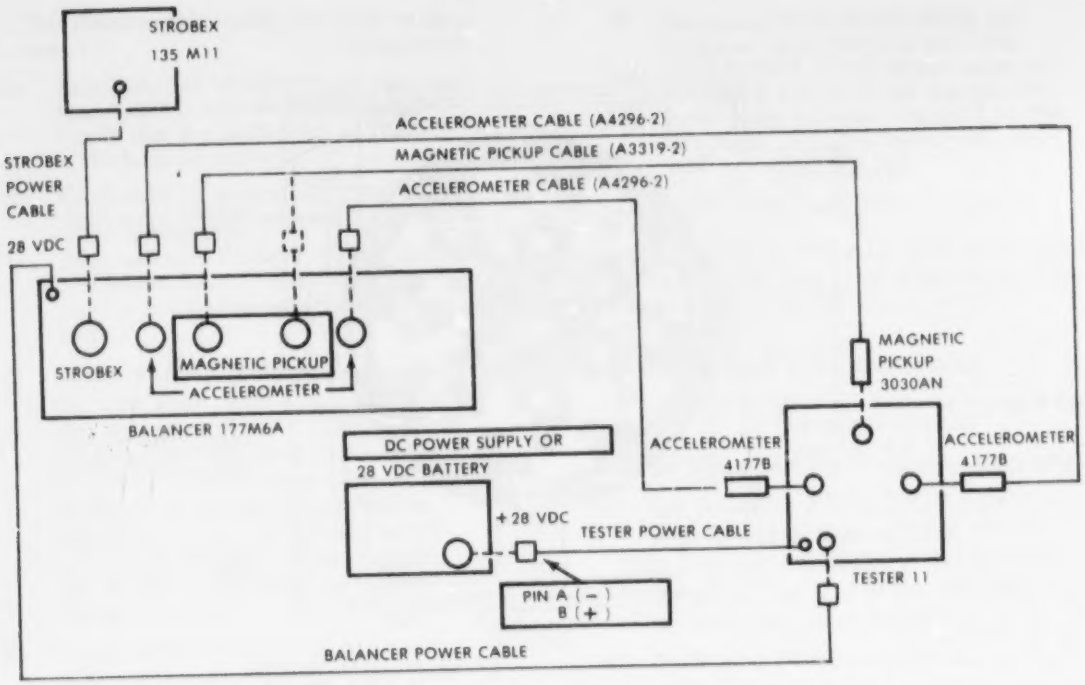

Figure 3-1. Tester, Accelerometer,and Magnetic Pickup Installation

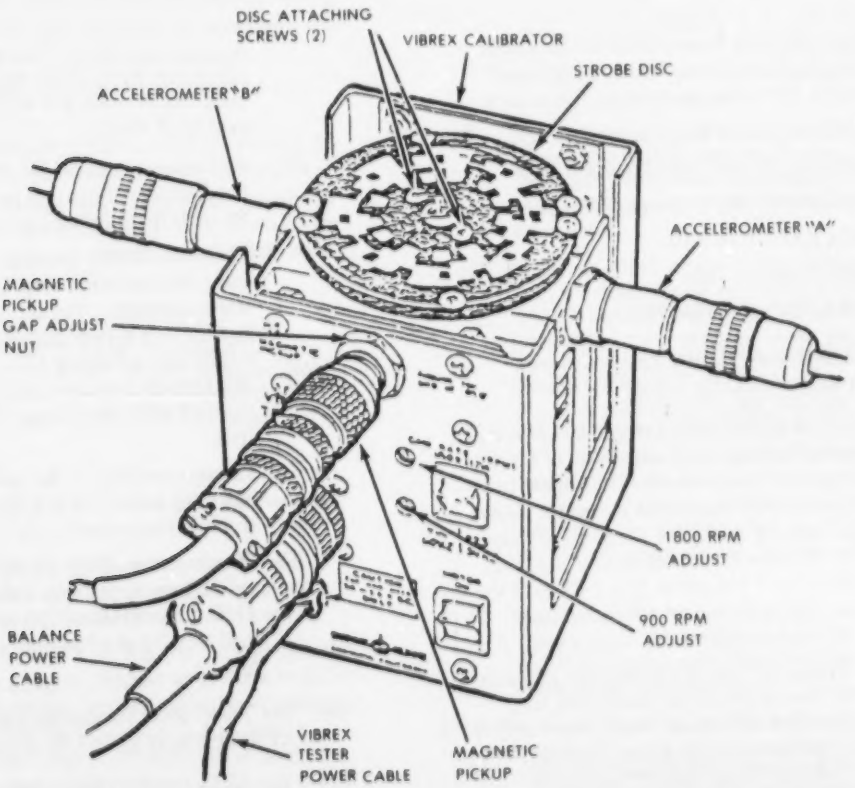

Figure 3-2. Tester, Accelerometer,and Magnetic Pickup Installation

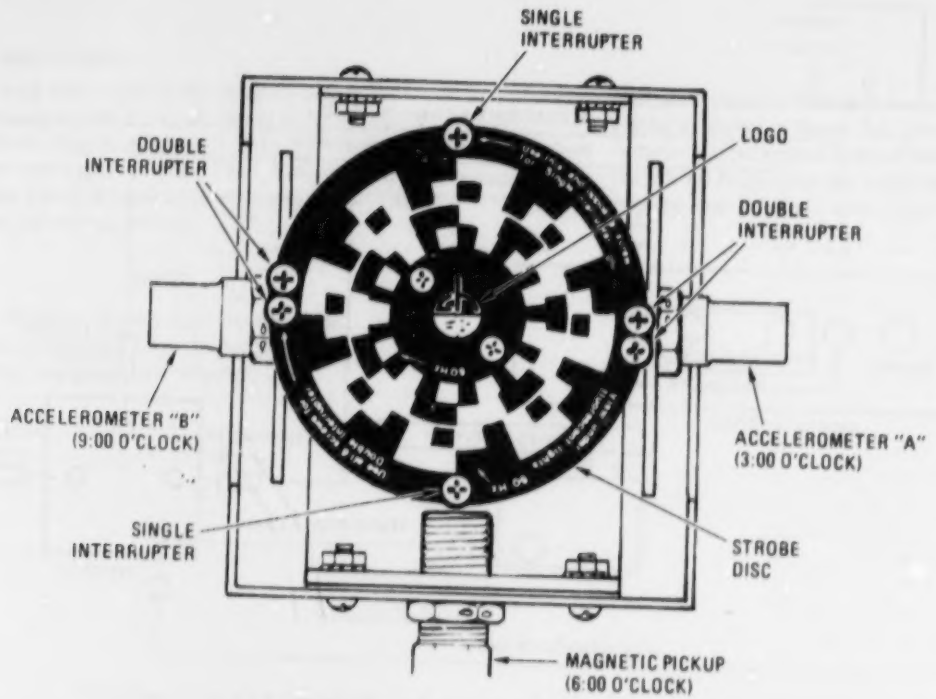

Figure 3-3. Tester Interrupter Placement

(3) Connect Balancer Power Cable to the Tester and ensure Tester Power Cable is still connected to +28 vdc power source.

(4) Set Balancer controls as follows:

(a) INTERRUPTER LOGIC to DOUBLE.

(b) MAGNETIC PICKUP to COMMON.

(c) RPM RANGE to X10.

(d) RPM TUNE to 180.

(e) FUNCTION to CHANNEL A.

(5) Adjust Tester as follows:

(a) Set MOTOR switch to ON.

(b) Set CAM RATE (RPM) switch to 1800 and observe that the black and white outer ring of segments on the strobe disc appear to be stopped when illuminated by 60 Hz fluorescent room lights. If the segments are not stopped under 60 Hz fluorescent lighting, adjust 1800 RPM adjust (fig. 3-2) until the outer ring of black and white segments appear to be stopped.

(c) Set Tester CAM RATE (RPM) and Balancer RPM Tune to 900. RPM RANGE to X1. Observe that the second ring of black and white segments on the strobe disc appear to be stopped when illuminated by 60 Hz fluorescent room lights. If segments are not stopped under 60 Hz fluorescent lighting, adjust 900 RPM adjust (fig. 3-2) until the second ring of black and white segments appear to be stopped.

(d) Adjustment with 50 Hz power source for the fluorescent lights is the same as for 60 Hz with the following exceptions:

1. The tester strobe disc speed is calibrated using the two inner rings of black and white segments. The third ring from the outside will appear stopped when the strobe disc is turning 1714 rpm. The inner ring (fourth from the outside) will appear stopped when the strobe disc is turning 923 rpm.
2. The rpm settings of the Balancer and Strobex shall read 1714 and 923 instead of 1800 and 900 respectively.
3. Ensure rpm readings are still within ±2%, and IPS meter readings are still within ±10%. The Balancer IPS meter reading shall be 0.75 @ 1714 rpm and 0.47 @ 923 rpm.

(6) Set Tester rotor for double interrupter with all six screws in place (fig. 3-3).

(7) Set Tester CAM RATE (RPM) and Balancer RPM Tune to 1800 RPM. RPM RANGE to X10.

(8) Test Balancer with double interrupter as follows:

(a) Run Tester at 1800 RPM and push and hold TEST button on Phazor section. Verify that the 12:00, 6:00, and 1:00 O'clock lamps light.

(b) Release TEST button and observe clock angle of lighted lamp.

(c) Push and hold VERIFY TUNE button and adjust RPM TUNE dial to return light to clock angle observed in above step.

(d) Release VERIFY TUNE button and observe new clock angle. Repeat until there is no change whether VERIFY TUNE button is pressed or released. Read clock angle with the VERIFY TUNE button released. After tuning, verify that the Phazor indicates between 2:30 and 3:30 o'clock, the IPS meter reads between 0.72 and 0.88 IPS, and the RPM TUNE dial reads between 176 and 184 RPM.

(e) Change RPM RANGE switch to X1 and RPM TUNE dial to 900. Set Tester CAM RATE switch to 900 RPM. Repeat steps (a) through (d), above. Verify that the IPS meter reads between 0.36 and 0.44 IPS and RPM TUNE dial reads between 882 and 918 RPM.

(9) Test Balancer with single interrupter as follows:

(a) Set INTERRUPTER LOGIC switch to SINGLE. leave others as set in step (4).

(b) Remove the two opposite pairs on interrupter screws on the Tester (four total) leaving only the two opposite single screws. Set tester motor switch to ON.

(c) Set Tester CAM RATE (RPM) and Balancer RPM Tune to 1800 RPM. RPM RANGE to X10 and push an hold TEST button on Phazor. Verify that only the 12:00 or 12:30 clock lamp lights.

(d) Release the TEST button and observe clock angle of lighted lamp.

(e) Push VERIFY TUNE button and adjust RPM TUNE dial to return lamp to clock angle observed before button was pushed.

(f) Release VERIFY TUNE button and observe new clock angle. Repeat until there is no change between button pushed and released. Verify that the indication in the Phazor lights is between 8:30 and 9:30 o'clock, the IPS meter reads between 0.72 and 0.88 IPS, and the RPM TUNE dial reads between 176 and 184 (1800 RPM).

(g) Set Tester CAM RATE (RPM) and Balancer RPM TUNE to 900 RPM. RPM RANGE to X1. Repeat steps (c) through (f) above. Verify that the IPS meter reads between 0.36 and 0.44 IPS and the RPM TUNE meter reads between 882 and 918 RPM.

b. Adjustments. No adjustments can be made.

3-6. Strobex Checkout. The Strobex is checked by the tester using Balancer unit. If the Balancer and Strobex checks are not within specifications perform paragraph 3-8 below:

a. Performance Check of the Balance Mode.

(1) Connect VIBREX and Tester as shown in figure 3-1.

(2) Set Tester CAM RATE switch to 1800 RPM.

(3) Set Balancer FUNCTION switch to A or B. Set Balancer RPM TUNE to 180 and set balancer RPM range switch to the X10 scale. All other controls are unimportant.

(4) Set Strobex MODE switch to A.

(5) Set Tester rotor for double interrupter (all six interrupter screws installed, fig. 3-3).

NOTE

The Magnetic Pickup is not required, but it need not be disconnected.

(6) Set Tester MOTOR switch to ON and illuminate Tester rotor with the Strobex. Verify that the stem of the h in the logo appears stopped in two positions.

(7) Note the clock angle of the stem of the h in the logo. Push and hold VERIFY TUNE button and adjust RPM TUNE dial to return images to clock angle observed before button was pushed. Release VERIFY TUNE button and observe new clock angle. Repeat until there is no change whether VERIFY TUNE button is pushed or released. When the Balancer is properly tuned, the stem of the h in the logo at the center of the disc appears stopped and double at 1:30 and 7:30 O'clock (fig. 3-4).

(8) Set Tester CAM RATE (RPM) and Balancer RPM TUNE to 900 RPM RANGE to X1. Observe the same results as in step (7).

b. Performance Check of the Track Mode.

(1) Set Balancer MAGNETIC PICKUP switch to COMMON, FUNCTION switch to TRACK, and INTERRUPTER LOGIC switch to DOUBLE. All other controls are unimportant.

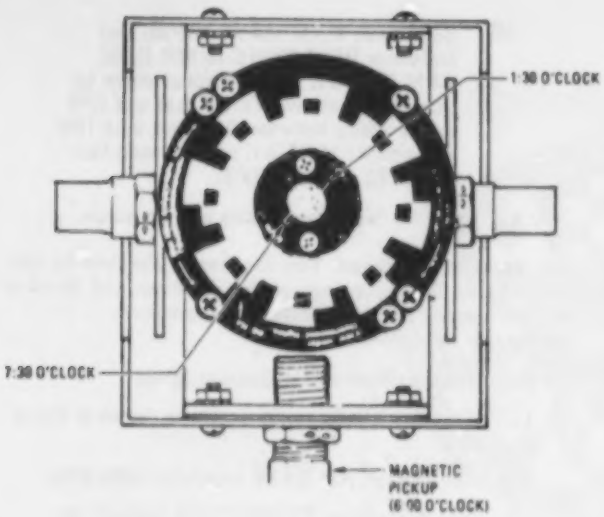

Figure 3-4. Logo at 1:30 and 7:30 O'clock

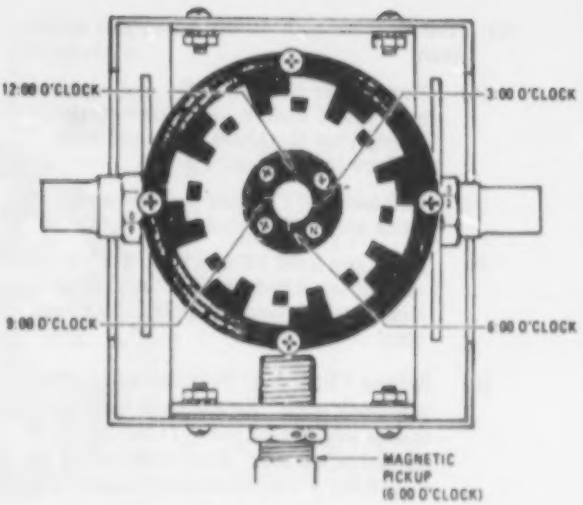

Figure 3-5. Logo at 12:00, 3:00, 6:00, and 9:00 O'clock

(2) Set up Tester rotor for double interrupter (all six interrupter screws installed).

(3) Set Strobex MODE switch to A.

(4) Illuminate Tester rotor with Strobex. Verify that the stem of the h in the logo appears stopped at 12:00, 3:00, 6:00, and 9:00 o'clock (fig. 3-5).

(5) Set Tester CAM RATE (RPM) and Balancer RPM TUNE to 1800. RPM RANGE to X10. Observe the same results.

(6) Set INTERRUPTER LOGIC switch to SINGLE.

(7) Shut off Tester.

(8) Remove the two opposite pairs of interrupter screws on the Tester (four total) leaving only the two opposite single screws (fig. 3-3).

(9) Run the Tester at 1800 RPM and illuminate the rotor with the Strobex. Verify that the stem of the h appears stopped at 12:00 and 6:00 o'clock.

(10) Set Tester CAM RATE (RPM) and Balancer RPM TUNE to 900. RPM RANGE to X1. Observe the same results.

(11) Shut off Tester.

e. Performance Check of the Strobex Locking Oscillator Mode.

(1) Remove interrupter screws from the Tester disc leaving only the one to which the stem of the h points (fig. 3-6).

(2) Set Strobex MODE switch to position E and RPM dial to 090.

(3) Run Tester at 1800 RPM and illuminate Tester rotor with the Strobex.

(4) Adjust Strobex RPM dial until the stem of the h appears stopped at 6:00 o'clock.

(5) Set Strobex RPM dial to 180 (twice actual rotor rate) and adjust Strobex RPM dial until the stem of the h appears stopped at 12:00 and 6:00 o'clock.

(6) Reduce the Strobex RPM dial setting while observing the h image. Verify that the stem of the h remains at 6:00 o'clock but the 12:00 o'clock stem moves clockwise until about 2:00 or 2:30 o'clock. Further deduction of the Strobex RPM dial setting causes the image to become very erratic.

(7) Set Strobex MODE switch to B and RPM dial to 180 (450 rotor RPM times one blade times 0.4, as stated on Strobex rear panel).

(8) Operate Tester at 900 RPM and illuminate Tester disc with the Strobex. Adjust Strobex RPM dial until stem of h appears stopped at 6:00 o'clock.

(9) Increase the Strobex RPM dial setting to slightly above 180 and verify that the image starts revolving counterclockwise.

(10) Set Strobex RPM dial to 360 and adjust until the stem of the h appears stopped at 12:00 and 6:00 o'clock.

(11) Reduce the Strobex RPM dial setting while observing the h image. Verify that the stem of the h remains at 6:00 o'clock and the 12:00 o'clock stem moves clockwise.

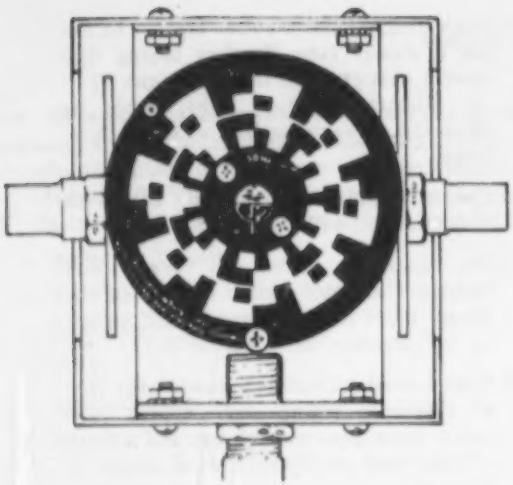

Figure 3-6. Logo at 6:00 O'clock

d. Performance Check of the Strobex Free-Running Mode (Stopped Image).

NOTE

In the free-running mode, the images will not be stopped except by precise adjustment of the Strobex RPM dial.

(1) Set Strobex MODE switch to C and RPM dial to 900.

(2) Set Tester CAM RATE (RPM) switch to 1800 RPM.

(3) Illuminate disc with the Strobex and observe the logo in the center. Adjust the Strobex RPM dial for a single stopped image of the logo. Verify that the RPM dial reads between 855 and 945.

(4) Set MODE switch to D and set Strobex RPM dial to 180 (1800 RPM).

(5) Illuminate disc and adjust RPM dial for a stopped double image of the logo. Verify that the Strobex RPM dial reads between 171 and 189 (1710 and 1890 RPM).

e. Adjustments. There are no internal adjustments to be made to the Strobex, with the exception of the flash tube focus adjustment (para. 3-10.c).

3-7. Accelerometer and Magnetic Pickup Checkout. The accelerometer and magnetic pickup, plus cables are checked during the Balancer checks in paragraph 3-5. Balancer FUNCTION switch on positions A and B checks both accelerometers. If the Balancer performance checks are not within specifications perform paragraph 3-8 below.

3-8. Signal Simulator Field Operational Checkout. The Signal Simulator, P/N B4305, will be very useful as it quickly verifies all all functions of the Vibrex Text Set. This will quickly isolate the fault to either the cables and transducers or the Balancer/Phazor circuits in unit.

a. Performance Check of Balancer/Phazor Circuit.

NOTE

No other cables are connected to the Balancer unit. Signal Simulator connectors may loosen on Balancer cable receptacles during testing. Check Periodically and retighten as necssary.

(1) Connect Signal Simulator B4305 big cable connector into either accelerometer cable receptacle and small cable connector into magnetic pickup cable receptacle on Balancer unit.

(2) Connect Balancer power cable to 28 vdc, 3 amps minimum power source. Observe polarity pins A(-) and B(+) if portable dc power supply is used. Verify that at least one lamp in Phazor ring of lights is illuminated. (If not, see Table 3-1).

(3) Set the following controls as follows:

(a) FUNCTION to A CHANNEL.

(b) MAGNETIC PICKUP to COMMON.

(c) RPM RANGE to X1.

(d) INTERRUPTER LOGIC to SINGLE.

NOTE

The older Balancer units (without the A suffix) are switched automatically to Double Interrupter Logic when the 135M-10 Strobex is plugged in. Therefore, Phazor testing and tuning of Balancer unit must be accomplished without the Strobex plugged in, so as to realize the simple Interrupter Logic.

(4) Adjust Balancer RPM TUNE dial to the lowest RPM (540) reading as shown on Signal Simulator nameplate.

NOTE

When pressing VERIFY TUNE button, hold button a minimum of 5 seconds due to slow reaction time of Phazor at lower RPM.

(5) Press TEST button and check that the Phazor 12:00 clock light is lighted. Release TEST button. (If not, see Table 3-1).

(6) Observe PHAZOR light clock angle. Press VERIFY TUNE button and hold. If clock light angle moves, hold VERIFY TUNE button and adjust RPM TUNE to return to unpushed clock angle.

(7) Release VERIFY TUNE button. Observe new unpushed clock angle. Press VERIFY TUNE button and hold. If clock light angle moves, hold VERIFY TUNE button and return to new unpushed clock angle remains the same whether VERIFY TUNE button is pushed or released.

(8) PHAZOR light should be between 2:30 and 3:30 when lighted. If not, hold VERIFY TUNE button and adjust Balancer RPM TUNE control for 3:00 O'clock. Balancer TUNE meter will indicated between 513 and 567 RPM.

(9) Press PUSH for SCALE 2. IPS meter will indicated between 3.15 and 3 85 IPS.

NOTE

Balancer unit without the A Suffix will not operate at this higher RPM. Only amplitude IPS meter can be checked.

(10) Set RPM RANGE to X10 position and RPM TUNE dial to the highest RPM (1080) reading as shown on Signal Simulator nameplate.

(11) PHAZOR lights should be at 1:30 and 7:30 clock angle $\pm$1.0 clock angle. If not, hold VERIFY TUNE button and adjust Balancer RPM TUNE control to 1:30 and 7:30 clock angle. Balancer RPM TUNE meter will indicated between 1026 and 1134 RPM.

(12) IPS meter will indicate between .81 and .99 IPS.

(13) Disconnect Signal Simulator.

b. Adjustments. No adjustments can be made. If the results of the check are not within specifications return Vibrex to the AVIM or Calibration Repair Center (CRC). Do not perform performance check 3-8c.

c. Performance Checks of Magnetic and Accelerometer Pickups, plus Cables.

(1) Connect Strobex to Balancer unit.

(2) Set Strobex Oscillator switch on Model 135M-10B to ON or set MODE switch to positions B, C or D on Model 135M-11.

(3) Push Trigger and Strobex should be firing a steady rate. Strobex tuning dial should change flash rate. A bright 10" - 15" diameter spot of light should be observed on some surface when 10-15 ft. away.

(4) Connect Magnetic pickup cable to Balancer unit with magnetic pickup.

(5) Set Balancer switch to Track and Strobex Oscillator switch to OFF on the Model 135M-10B, or place MODE switch to "A" position on Model 135M-11.

(6) Pass a steel screwdriver blade over face of magnetic pickup by tapping pole piece. Each pass should produce a flash of light from the Strobex when trigger is pushed.

(7) If failure develops, check magnetic pickup cable for open or shorted wires in cable.

(8) Connect accelerometer cable with accclerometer to Balancer A CHANNEL receptacle.

(9) Position Balancer controls as follows:

(a) FUNCTION to a CHANNEL.

(b) RPM TUNE dial to 500.

(c) RPM RANGE to X1.

(10) Tap accelerometer with screw driver handle serveral taps should cause a momentary upscale reading on the IPS meter. Reading will die out and meter will return to ZERO.

(11) If failure develops, check accelerometer cables for open or shorted wires in cable.

d. Adjustments. No adjusments can be made except to the Strobex (See paragraph 3-10c).

Section III. INSTALLATION

3-9. General. Detailed installation instructions for the following VIBREX accessories are illustrated and explained in applicable aircraft technical manuals. Checklists are also provided with the VIBREX for each type aircraft. Figure 3-7 illustrates a typical VIBREX to airframe interface.

a. Reflective Targets

b. Brackets

c. Interrupters

d. Cables

e. Accelerometers

f. Magnetic Pickups

3-10. Pre-operational Checklist. This procedure is to be performed after preparation of the aircraft to verify that the equipment is correctly installed and ready for test.

a. Main Rotor.

(1) Magnetic Pickup is installed on the fixed swashplate.

(2) Interrupter is installed on the rotating swashplate.

(3) Reflective Targets are installed on the blade tips.

(4) Accelerometers are installed on the airframe to sense main rotor-induced vibrations.

b. Tail Rotor.

(1) Accelerometer is attached to or near the tail rotor gear box to sense tail rotor-induced vibrations.

(2) Reflective, self-adhesive targets are applied to one blade grip and to each blade tip.

c. Strobex Check.

(1) Connect Strobex to Balancer.

(2) Apply +28 vdc to system.

(3) Set MODE switch on the Strobex to B, C, or D.

(4) Pull trigger. Verify that Strobex begins firing

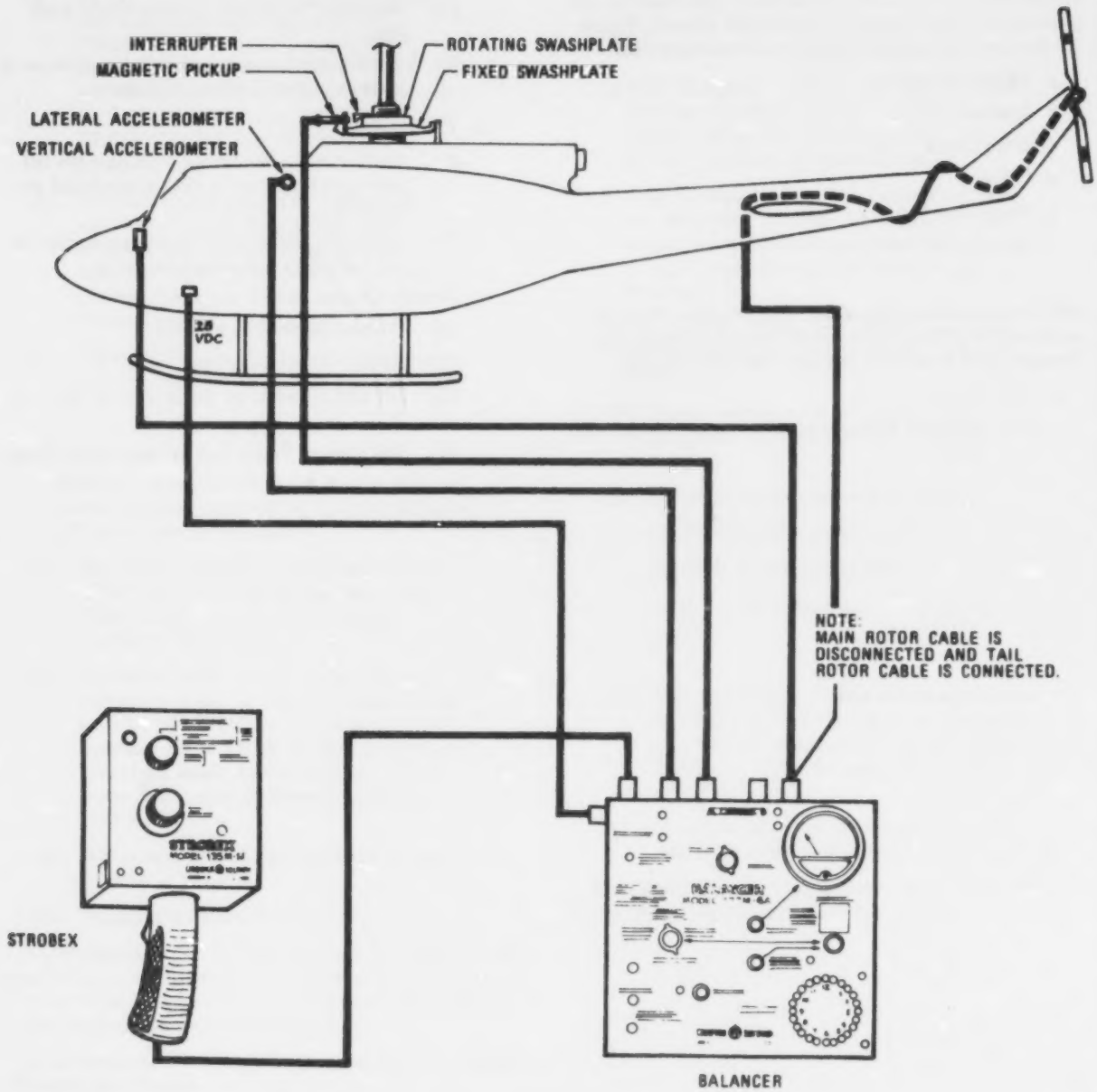

Figure 3-7. Typical VIBREX to Airframe Interface

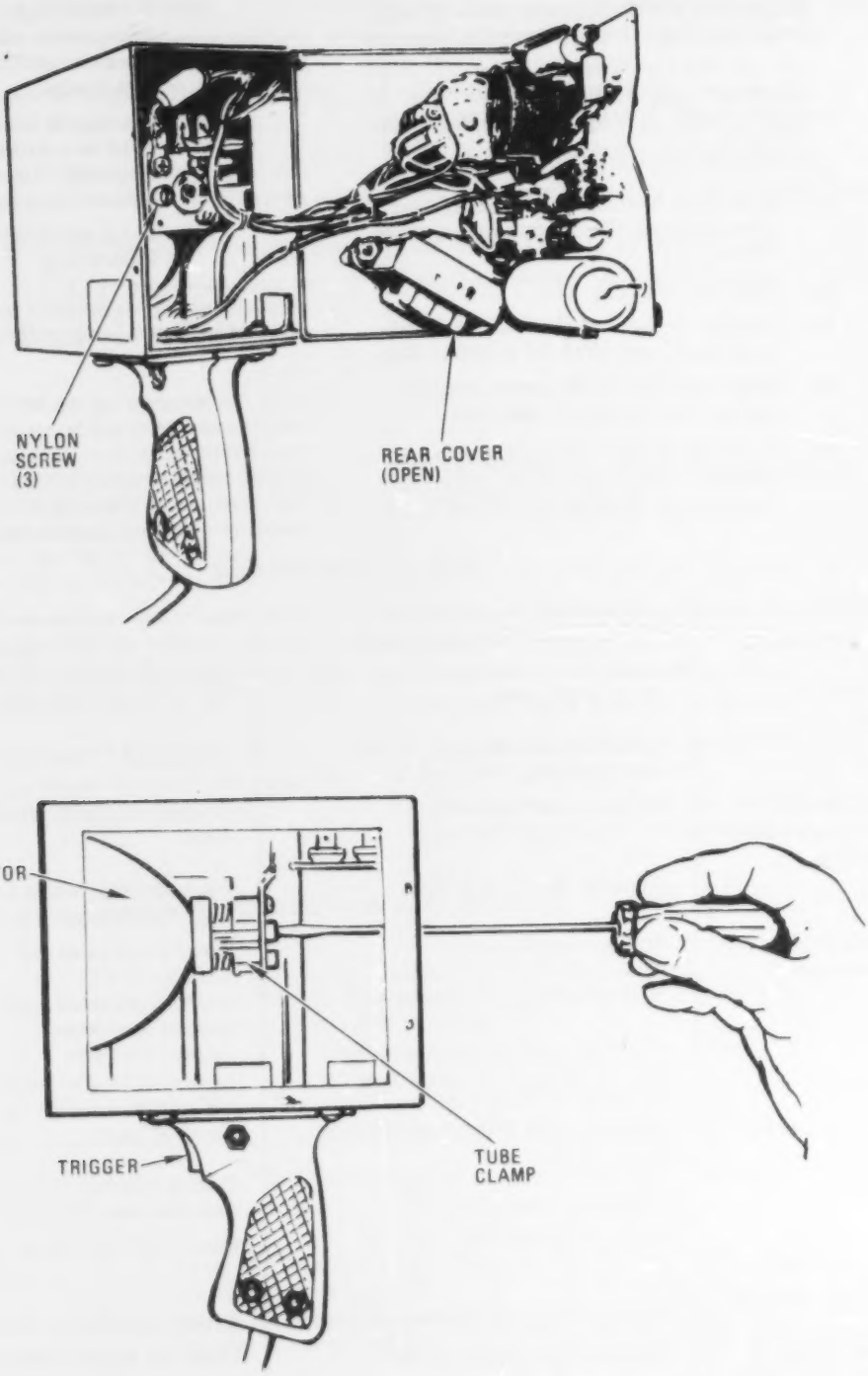

Figure 3-8. Strobex Focus Adjustment

at a steady rate and turning dial on rear panel smoothly changes flash rate.

(5) Direct lamp at ground and observe a bright 3 to 4 inch diameter spot of light or at a nearby (10 to 20 feet) flat surface and observe a bright 10- to 15- inch diameter spot of light. If the spot of light is not as required, perform the following focus instructions:

(a) Remove six 4-40 screws and lockwashers from rear cover. Do not remove any other screws.

(b) Open rear cover (fig. 3-8).

(c) Energize the unit and place MODE switch in position D and RPM dial to 500 to 600.

(d) Project beam on a dark surface, approximately 3 feet in front of flash tube.

(e) If a dark center appears, use an insulated screwdriver to turn the three nylon screws clockwise until a uniform bright spot appears (keep it about 4 inches in diameter).

(f) If a small bright spot appears in a large light pattern, adjust nylon screws counterclockwise until a uniform 4-inch diameter spot is seen.

(g) Accomplish final focus by projecting the beam on a wall approximately 15 to 20 feet away. Adjust for a spot approximately 1 foot in diameter.

(h) Install rear cover with six 4-40 screws and lockwashers.

d. Controls. Set Balancer and Strobex controls as required for the test being performed.

3-11. Troubleshooting the VIBREX While Installed on the Aircraft. Most malfunctions may be readily traced to a defective part or to an improper adjustment. Table 3-1 is a troubleshooting guide for the most common malfunctions. After reviewing table 3-1, and the VIBREX is still not operative, perform the following:

Table 3-1. Troubleshooting

Symptoms	Probable cause	Remedy
No lights in Phazor.	Dc polarity wrong.	Check polarity (pin B is hot +, pin A is ground).
	Circuit breaker, to circuit in use, not turned on.	Turn circuit breaker on.
Unsteady tail rotor image when balancing.	Oscillator not in Mode A.	Strobex must be in Mode A when balancing tail rotor.
	Vibration level is very low.	When vibration level is low, clock angle is uncertain. Jittery image is indicator of good balance.
Unable to observe targets.	Strobex out of focus.	Remove rear panel and adjust focus.
	Reflective Targets worn or dirty.	Replace, and avoid handling reflective surface. Replace as necessary.
	Flash tube cracked (weak blue flash).	Replace flash tube.
	Not aiming Strobex correctly and/or not in line with light source.	Look directly over top of Strobex, and search in a W pattern along the tip path.
	Strobex and/or Balancer switched to wrong position.	Check settings.
	Protective varnish or coating over reflector material.	Coating kills reflective properties of exposed bead material. DO NOT COAT.
Targets appear scattered when tracking main rotor.	Strobex oscillator ON.	Check oscillator switch. MUST be in A or B.
	Interrupter installed backwards or bent.	Refer to installation instructions.
No test pattern in Phazor when TEST button is pushed.	Magnetic Pickup gap too large.	Check gap between Magnetic Pickup and Interrupter.
	Faulty Magnetic Pickup Cable or Magnetic Pickup.	Check and repair or replace as required. Magnetic Pickup should read about 1000 ohms.
	INTERRUPTER LOGIC switch set incorrectly.	Set to DOUBLE.

Table 3-1. Troubleshooting - Continued

Symptoms	Probable Cause	Remedy
	Polarity of Magnetic Pickup incorrect.	Pulse should first go negative, then sharply positive where Phazor triggers, then go negative to zero.
	Magnetic Pickup Cable plugged into Magnetic Pickup backwards (wrong polarity).	Check that indexing key is correctly lined up. It is not easy, but it can be plugged in backwards.
	RPM RANGE switch set to wrong range.	Set RPM RANGE to X1 for main rotor.
IPS and clock angle readings not repeatable; i.e., restoring weights to original condition does not give same readings.	Mechanical components on rotor are faulty. Bearings, dampers, rod-ends, etc., should all be rechecked.	Correct or replace faulty components.
False reading on Balancer's IPS meter.	When the Balancer's RPM TUNE dial is set below 100 (on any RPM RANGE) the circuitry is unstable and causes false readings on the IPS meter.	DO NOT USE BALANCER WITH RPM TUNE DIAL SET BELOW 100.

a. Connect VIBREX to helicopter 28 vdc power source and perform the field operational checkout in paragraph 3-8. This will isolate if the Balancer unit, Strobex, Accelerometers or Magnetic Pickup, plus cables are at fault.

b. After performing step a, and the VIBREX is still not operative, refer to Chapter 4, Aviation Intermediate Maintenance Instructions, for bench testing of the VIBREX.

3-12. Removal of VIBREX from Aircraft. The VIBREX is removed from the aircraft as follows:

a. Disconnect 28 vdc power cable.

b. Disconnect signal cables from VIBREX.

c. Place Balancer and Strobex units in their proper locations in the Carrying Case.

d. Remove Cables, Accelerometers, Magnetic Pickups, and Brackets, and place in Carrying Case.

Section IV. INSPECTION AND SERVICE

3-13. Inspection. Table 3-2 provides a general guide for inspection of the VIBREX. The inspection should be performed after each use and prior to storage.

Table 3-2. Inspection Chart

Item	Condition	Remedy
Outside surfaces	Inspect for scratches, chips, dents, cracks, or missing hardware.	Repair, repaint, or replace as necessary.
Controls and switches	Inspect for loose knobs, binding controls, or cracked meter.	Tighten setscrews in knobs, or repair or replace parts as necessary.
Cables	Inspect cables for breaks, bent or broken pins, or other damage.	Repair or replace as necessary.

Section V. PREVENTIVE MAINTENANCE

3-14. Cleaning. Clean the components of the VIBREX whenever inspection indicates it is needed. Clean outside surfaces with a cloth dampened with a solution of mild detergent and water. Wipe dry with a clean cloth.

3-15. Painting. Touch up scratches and worn spots with black enamel.

3-16. Lubrication. For Lubrication of the VIBREX Tester see paragraph 4-31.

Section VI. REPAIR AND REPLACEMENT OF AUTHORIZED PARTS

3-17. Authorized repair of the Vibrex by Aviation Unit Maintenance personnel (AVUM) is indicated in Appendix B, Maintenance Allocation Chart.

3-18. Authorized repair of the Vibrex by Aviation Intermediate Maintenance (CRC) personnel is indicated in Appendix B, Maintenance Allocation Chart.

CHAPTER 4

AVIATION INTERMEDIATE MAINTENANCE (CRC) INSTRUCTIONS

Section I. PREPARATION FOR MAINTENANCE, STORAGE, AND SHIPMENT

4-1. Preparation for Maintenance. Ensure that a 28 vdc and a 120 vac, 60 Hz power source is available for the test equipment listed in table 1-3.

4-2. Preparation for Storage. Use the following procedure when preparing the VIBREX for storage:

a. Place the Tester, Accelerometers, Magnetic Pickups, Brackets, and Cables in the top compartment of the Carrying Case (fig. 1-1).

b. Place the Balancer, Strobex, and Gram Scale in their proper compartments in the Carrying Case (fig. 1-1).

c. Close Carrying Case.

4-3. Preparation for Shipment. Perform all steps in paragraph 4-2 and the following:

a. Place Carrying Case in shipping container.

b. Record missing or damaged components on the appropriate forms.

c. Return VIBREX through proper channels.

Section II. THEORY OF OPERATION AND ANALYSIS

4-4. Functional Theory of Operation. Before perfoming the checkout and analysis, the following simplified block diagrams and functional descriptions should be understood.

CAUTION

Extreme care should be exercised when using the VIBREX test set. This unit contains delicate electronic components and assemblies which may be easily damaged if subjected to physical abuse due to improper handling.

4-5. Balancer Section of Balancer. The electronics for the Balancer (fig. 4-1 and FO-1) are contained on the Balancer Circuit Card Assembly C4146.

a. Basically, the Balancer consists of two tuneable narrow band filters. With the VERIFY TUNE button released, the filters are connected in such a manner that they result in a single stagger-tuned filter centered at the frequency (RPM) determined by the RANGE switch and RPM TUNE dial. When the VERIFY TUNE button is pushed, it switches the filters from broad band (released) to narrow band (pressed). If the filter is not properly tuned, a large difference in phase shift through the filter is indicated as a sharp change in clock angle. When the filter is properly tuned, there is no phase shift and no clock angle change.

b. Inputs A and B from the Accelerometers are connected to operational amplifiers U107A and U110A, respectively. The operational amplifiers are a constant-current source to the two-stage isolation amplifier in the Accelerometer. The output of U107A is applied to the A input of FUNCTION switch S1201 and the output of U110A is applied to the B input. The output of S1201 is applied to operational amplifier U107B that, in conjunction with PUSH FOR SCALE 2 pushbutton S1203 and VERIFY TUNE pushbutton S1202, changes the gain of the circuit to make the IPS meter read within scale.

c. The output of U107B is applied to the first active filter loop consisting of operational amplifiers U105, U101A, U101B, U102A, and U102B. The filter is tuned to resonance by RPM TUNE dial R1201A, and by C106 through C111 selected by RPM RANGE switch S1204. The output of the filter at U102B is applied to U103A in the second active filter loop. This loop consists of U106, U103A, U103B, and U104B. The filter is tuned to resonance by RPM TUNE dial R1001B, and by C112 through C117 selected by RPM RANGE switch S1204. The two filters are stagger-tuned to broaden the pass-band to make tuning less critical and less subject to small changes in the input frequency. Disconnection of the two filters by VERIFY TUNE pushbutton S1202 removes the stagger-tuned effect and narrows the pass-band to provide fine tuning.

d. The output of the second filter is from U104A to operational amplifier U108B, whose output is rectified by a full wave bridge rectifier to drive IPS meter M1201. The output of U104A is also combined with the output of U106, via U108A, to produce a negative-going command at the output of U109B for each positive-going zero crossing of the filter output signal at U104A.

e. The output of U109B is differentiated and the negative spike triggers U109A, a monostable countdown circuit. U109A provides the positive sample command to the Strobex and the Phazor circuits for phase indication. The monostable countdown circuit, for command rates higher than approximately 40 Hz, automatically divides that rate by integer numbers so the output does not exceed 40 Hz.

4-6. Phazor Section of Balancer. The electronics for the Phazor (fig. 4-2 and FO-2) are contained on Phazor Circuit Card B4193.

a. The Phazor is a phase meter that displays the amount of lead-lag of one repetitive event with reference to anothe at the same frequency as a proportion of the time for a full cycle. The display is in the form of 24 lights, calibrated with a clock face, and the readout is from the illuminated lamp in the circle.

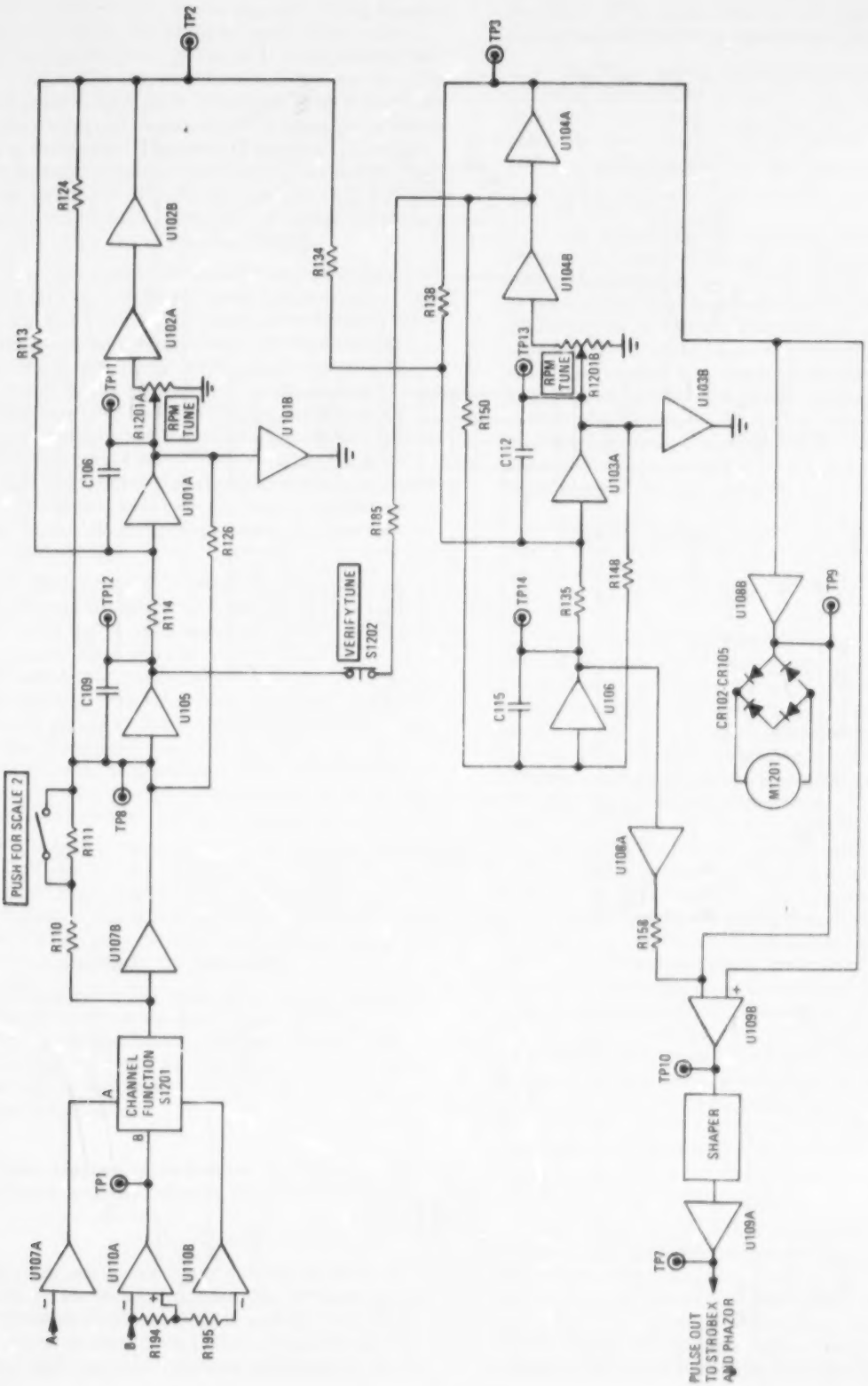

Figure 4-1. Balancer Simplified Diagram

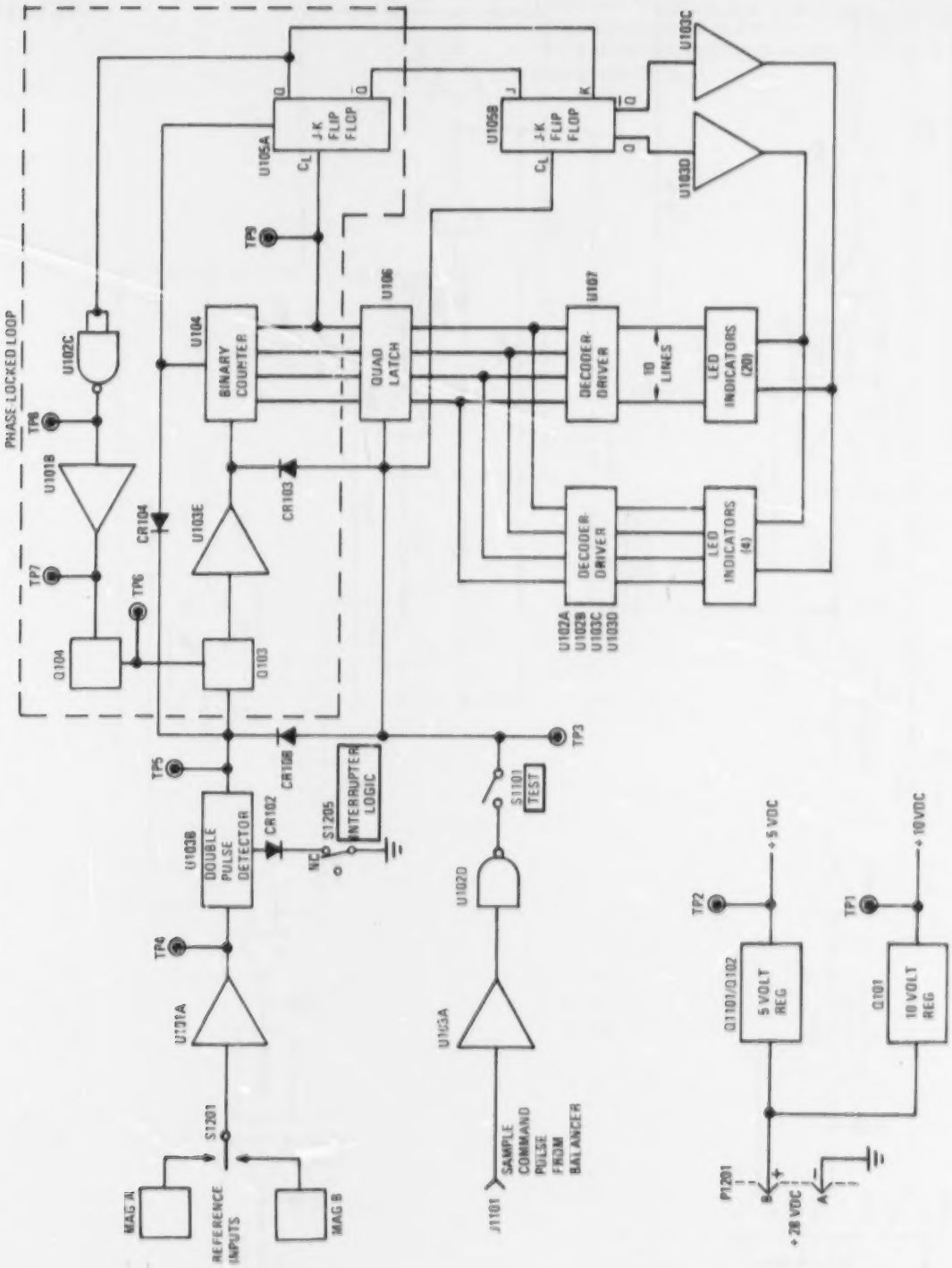

Figure 4-2. Phazor Simplified Diagram

b. The reference input from a Magnetic Pickup mounted to sense the rotation rate of the helicopter main rotor is applied through the MAG pickup jacks to operational amplifier U101A. The output of U101A is one negative pulse for each positive input pulse. Generally, there is one pulse per blade, except one blade will have a double pulse which is used as a reference. The network between U101A and U103B produces a positive pulse only for the double pulse when the cathode of CR102 is grounded by INTERRUPTER LOGIC switch S105. Thus, U103B is triggered at the one-per-revolution rate of the main rotor.

c. The positive pulse from U103B triggers unijunction oscillator Q103 and Q104 and resets binary counter U104 and JK flip-flop U105A. The output of oscillator Q103 and Q104 is applied through driver U103E to the clock input of the binary counter U104, which counts to 12, resets, counts to 12, and resets again. The 12-count output of U104 causes U105A to change state and change the polarity of integrator driver U102C and integrator U101B. The integrator output determines the frequency of oscillator Q103 and Q104 so that the counter totals 24 counts (twice 12) when the next reset command is applied to U103B. Thus, the oscillator operates at 24 times the reference input signal.

d. The binary state of counter U104 is applied to quad latch U106, and the output of flip-flop U105A is applied to the J and K inputs of JK flip-flop U105B, which also acts as a latch. The output of latch U106 is responsive to input signals from the counter only when a positive sample command from the Balancer is applied through U103A and U102D to enable the quad latch U106. Thus, the output of the latch remains in the same state that appeared at the input at the time of the sample command. Flip-flop U105B is clocked by the positive sample command and its output remains in the same state.

e. The output of the quad latch is decoded by decoder-driver U107 and decoder-drivers U102A, U102B, U103C, and U103D to light one of the 24 light-emitting diode (LED) indicators that correspond to the phase relationship between the one-per-revolution reference input signal and the vibration signal from the Balancer.

f. TEST switch S1201 removes the one-per-revolution sample command from the Balancer and substitues the reference input signal from the Magnetic Pickup. This provides one input signal for each blade. The clock display then is one light for each blade at the same angular positions as the blades.

4-7. Power Supplies. The Balancer and Phazor have separate power supplies operating from +28 vdc input power.

a. The Balancer power supply provides regulated +9 and -9 vdc for the Balancer circuits. The +9 vdc is provided by transistors Q104 and Q105 operating as a constant-current source to zener diode CR115. The -9 vdc is provided by a high frequency oscillator consisting of transistors Q101, Q102, Q103, and coil L101 operating as a constant-current source to zener diode CR114.

b. The Phazor power supply provides a regulated +5 vdc and +10 vdc for the Phazor circuits. The +5 vdc is provided by series regulator transistors Q1101 and Q102 (fig. 4-2). The regulated +10 vdc is provided by constant-current source transistor Q101 and zener diode CR110.

4-8. Strobex.

a. The Strobex (fig. 4-3 and FO-3) contains a point source, high intensity flash tube (V1201) fired by an oscillator operating in one of three modes: slave, locking, or free-running. As a slave oscillator, it is triggered by Accelerometer or Magnetic Pickup signals. As a locking oscillator, the frequency is set to a certain repetition rate and is synchronized by a one-per-revolution signal from a Magnetic Pickup. As a free-running oscillator, the frequency is set by a potentiometer calibrated in RPM. The oscillator is comprised of transistors Q3 and Q4, programmable unijunction transistor Q5, and SCR Q6 located on Blade Tracker Circuit Card C3984.

b. The oscillator is operated in one of five modes of operation controlled by MODE switch S501B and S501C. The following paragraphs (1) through (5), explain each of the five modes of operation:

(1) Mode A. When set to position A, the Strobex operates in a slave mode, flashing only when commanded by the Balancer and is used for main rotor tracking and tail rotor balancing. The rotating swashplate is fitted with two interrupters (one of which is double, because of the Phazor). When the Balancer is set to TRACK, the Strobex will flash twice-per-revolution, illuminating each of the two blade tips when they pass the front of the helicopter (and also when they pass over the tail boom). Thus, the two Tip Targets will be seen, superimposed, at the front of the helicopter. (They can also be seen over the tail boom, but this is not useful except for ground tracking.) Since one Tip Target has a reflective horizontal bar, and the other has a vertical bar, the judgement of track is simple. The Reflective Targets face inboard so they are viewed from the cabin, either on the ground or in-flight. When an Accelerometer is secured on the tail rotor gear box and connected to the Channel B input, the Balancer is switched to Mode B, and the Strobex will flash once-per-revolution in response to the vibration signal induced by the out-of-balance rotor. When a Reflective Target, secured to the rotor hub, is viewed from a distance with the Strobex, the target will appear stopped at some angle. This is the *clock angle* to be entered on the Balance Chart and will tell where to change weight.

(2) Mode B. Position B is also used for main rotor tracking where higher intensity light is required. The unique locking oscillator of position B is typically used for the larger rotors with four or more blades. In those cases, only one single interrupter is secured to the rotating swashplate and the oscillator causes the Strobex to flash for the other blades. By fine adjustment of the

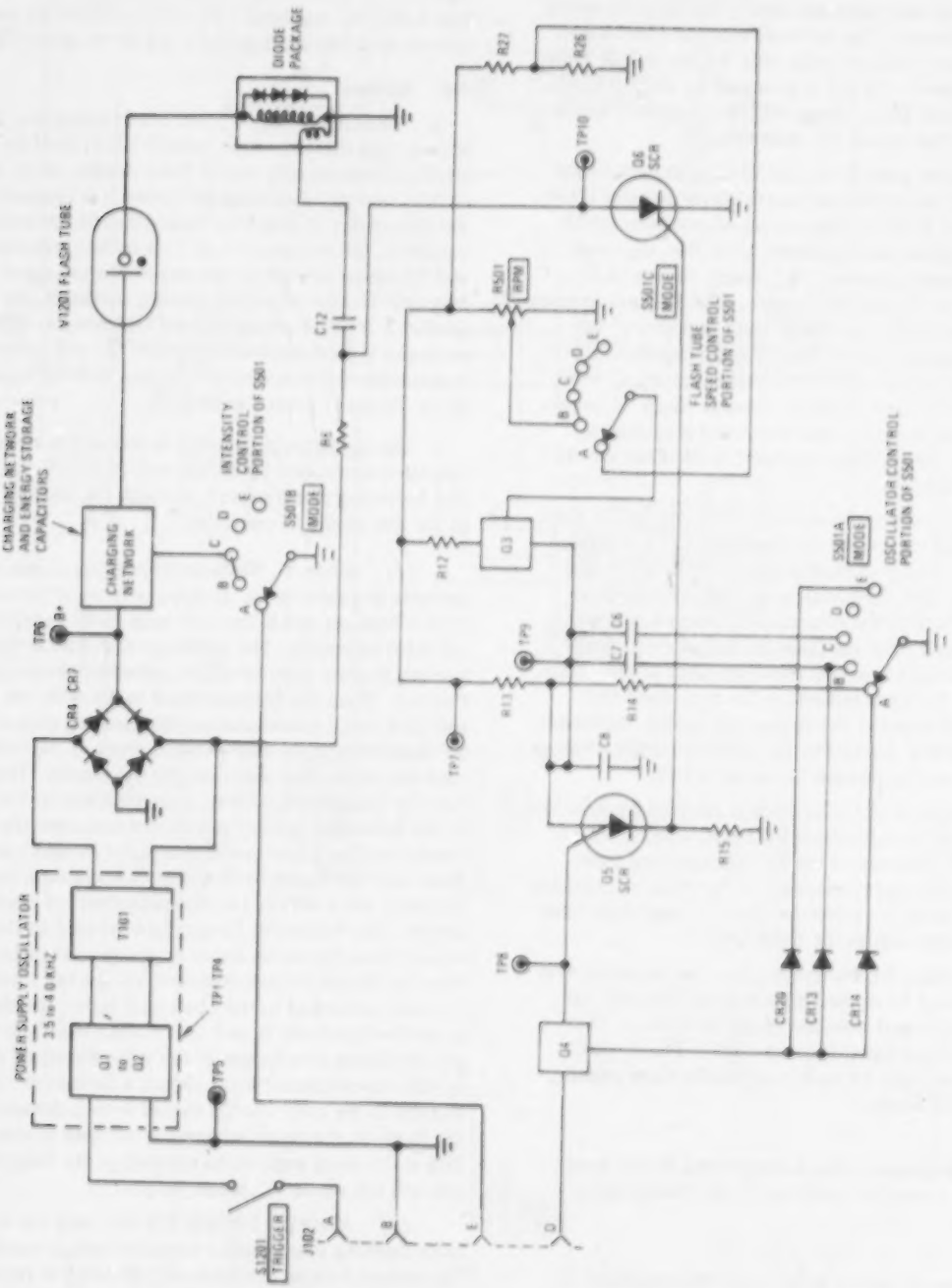

Figure 4-3. Strobex Simplified Diagram

Strobex RPM control, the blades may be spread for easy resolution. When applied to the two blade rotor system (Bell) where two interrupters are installed on the swashplate, position B is used for greater light output. The oscillator is set to flash at a rate slightly slower than blade rate (in accordance with the formula on the back of the Strobex, RPM=blade rate X 0.4). Then, the Interrupter commands the Strobex before the oscillator, and it operates as if there were no oscillator. In this case, the targets cannot be spread. The oscillator may be set to double the blade rate, in which case the Tip Targets will be seen at twice as many positions around the rotor disc. For instance, the targets of a two-blade rotor are typically seen at 12:00 and 6:00 o'clock (as determined by location of Interrupters). If the oscillator is set to double the blade rate, the targets will also be seen at 3:00 and 9:00 o'clock.

(3) Mode C. Mode C is a free-running oscillator and is used as a tachometer for speed (RPM) measuring. All external signals are disconnected and the Strobex flashes only in response to its internal oscillator. Flash rate is adjustable from 100 to 1,000 RPM (flashes-per-minute).

(4) Mode D. Mode D is also a free-running oscillator and is used for tail rotor tracking and speed measuring. Since there is no Magnetic Pickup mounted on the tail rotor, the flash rate of the free-running oscillator is adjusted to double or four times the rotor rate (for a two-blade tail rotor), so the single Tip Target appears as a stopped image of two or four. Then, by viewing the rotor disc edge-on from the cabin door, reflective Tip Targets can be seen superimposed for a judgement of track. Flash rate is from 1,000 to 10,000 RPM.

(5) Mode E. Mode E is a locking oscillator like Mode B, but operates at higher rates and is used for viewing the track of airplane propellers. It requires a Magnetic Pickup input pulse.

4-9. Tester.

a. The circuitry in the Tester (fig. 4-4) includes a 2-ampere fuse (F101) and a 36-volt zener diode (CR102). These components protect motor drive circuit (B1) in the event the unit is accidentally connected to an improper power outlet.

b. CR101 is a polarity project diode which prevents reverse dc voltage from being applied to B1. If reverse polarity is applied, no damage will result, but the unit will not operate until polarity is corrected.

c. Switch S101 selects either R102 or R104 to synchronize B1 motor speed.

d. Switch S102 applies 28 vdc power to the B1 motor drive circuits.

Section III. TROUBLE ANALYSIS AND REPAIR

4-10. Trouble Analysis. This section contains instructions and procedures for troubleshooting and repair of the VIBREX. Use of the Tester is the basis for isolation of a trouble to the Balancer, Strobex, airframe mounted components, or interface cabling. Normally, this will have been

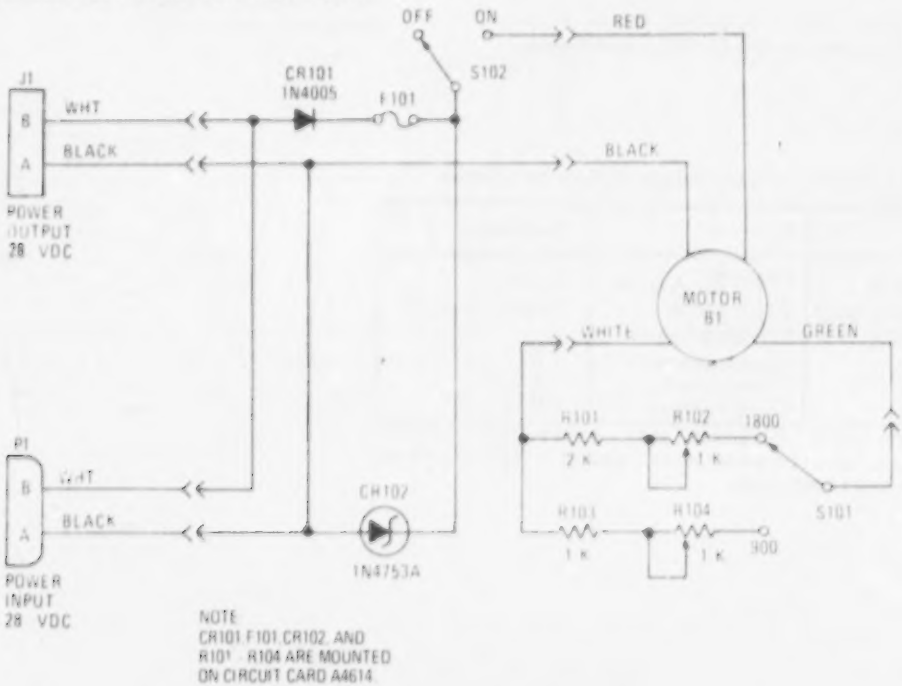

Figure 4-4. Tester Schematic Diagram

accomplished in actual use of the equipment at the flight line. Therefore, at AVIM (CRC) maintenance, it will only be necessary to refer to the applicable paragraph in this section that relates to the defective component. Troubleshooting is presented in the same sequence as the VIBREX checkout procedures contained in Chapter 3, Section II.

NOTE

Aviation Intermediate Maintenance (CRC) will perform only the authorized maintenance which includes replacement and repair of components and end items indicated on the Maintenance Allocation Chart which can be accomplished efficiently with available skills, tools, and test equipment. Evacuate unserviceable circuit boards/components and end items beyond capability of CRC to the Depot.

4-11. Balancer Tests. Perform performance checks (a) thru (b) only when directed by the troubleshooting procedure Table 4-17 or when applicable.

a. Perform Balancer resistence checks as applicable in Table 4-1. Figure 4-5 shows the location of Balancer test points.

b. Remove rear cover by removing four screws.

CAUTION

Disconnect +28 vdc power source before making resistance checks with a multimeter.

Table 4-1. Balancer Power Supply Resistance Checks

From (+)	To (-)	Resistance
P1201 pin B	P1201 pin A (gnd)	4 to 6 k
P1201 pin A (gnd)	P1201 pin B	Greater than 1M
P1201 pin A	Circuit ground	0
Chassis	Circuit ground	1 K
TP5	Circuit ground	3 K to 6K
TP6	Circuit ground	2 K to 20 K

NOTE: RESISTANCE READINGS MAY DIFFER FROM THOSE SHOWN AS SEMICONDUCTORS EXHIBIT NON-LINEAR RESISTANCE CHARACTERISTICS

c. Voltage Test.

(1) Connect +28 vdc power supply only to Balancer as shown in Figure 4-6.

(2) Set Balancer RPM Dial to 100.

(3) Use VOM to measure voltages at test point in Table 4-2.

Table 4-2. Balancer Voltage Checks

From (+)	To (-)	Voltage
TP1	Circuit ground	0 ± 0.5 vdc
TP2	Circuit ground	0 ± .02 vdc
TP3	Circuit ground	0 ± .02 vdc
TP4	Circuit ground	-7 ± 0.1 vdc
TP5	Circuit ground	+9 ± 0.9 vdc
TP6	Circuit ground	-9 ± 0.9 vdc
TP7	Circuit ground	8 ± 1.0 vdc
TP8	Circuit ground	0 ± .02 vdc
TP9	Circuit ground	0 ± .02 vdc
TP10	Circuit ground	-8 ± 1.0 vdc
TP11	Circuit ground	0 ± .02 vdc
TP12	Circuit ground	0 ± .02 vdc
TP13	Circuit ground	0 ± .02 vdc
TP14	Circuit ground	0 ± .02 vdc

NOTE: CIRFUIT GROUND IS LOCATED ON R/H TERMINAL OF C-123

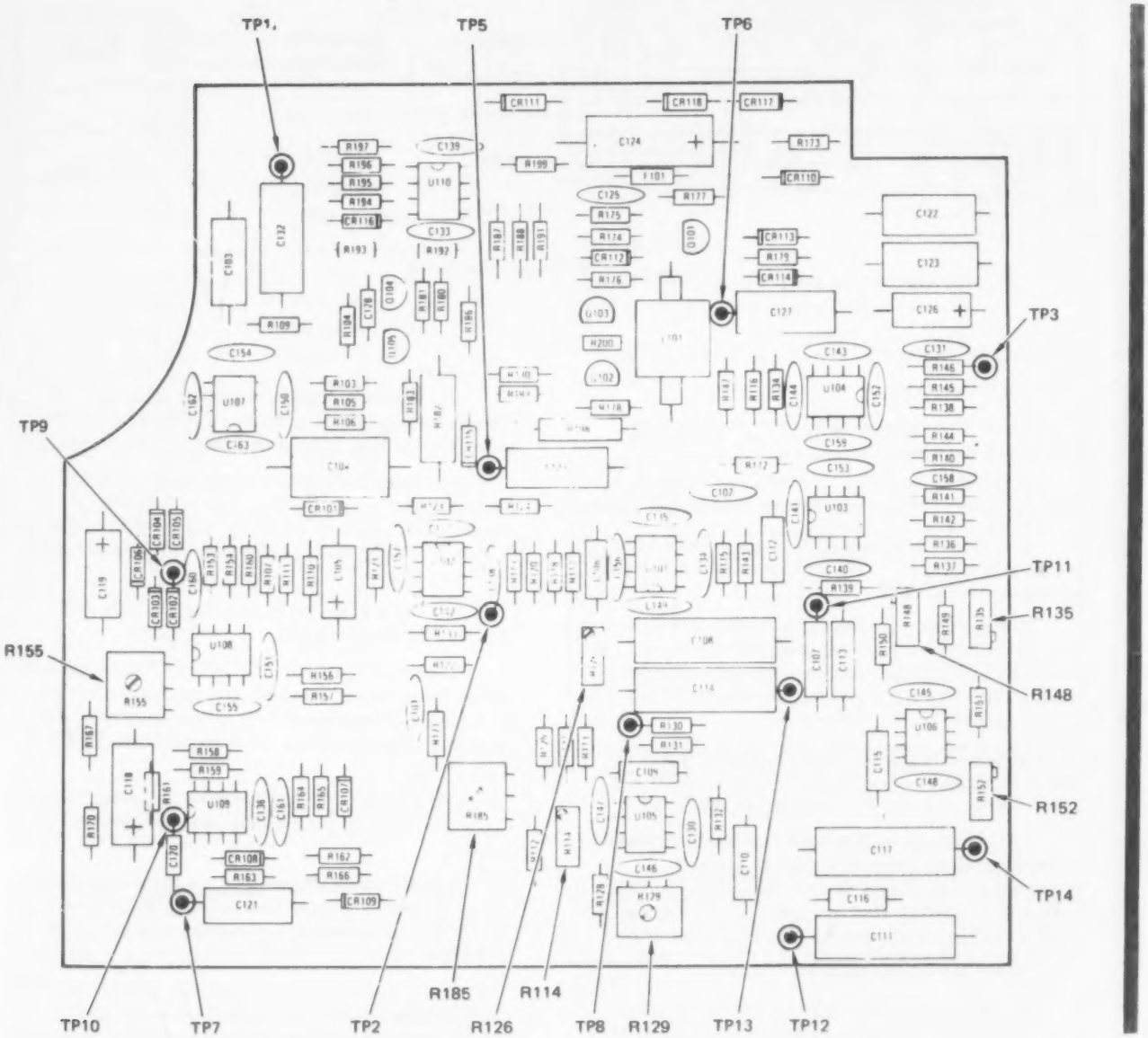

Figure 4-5. Balancer Test Points and Adjustments

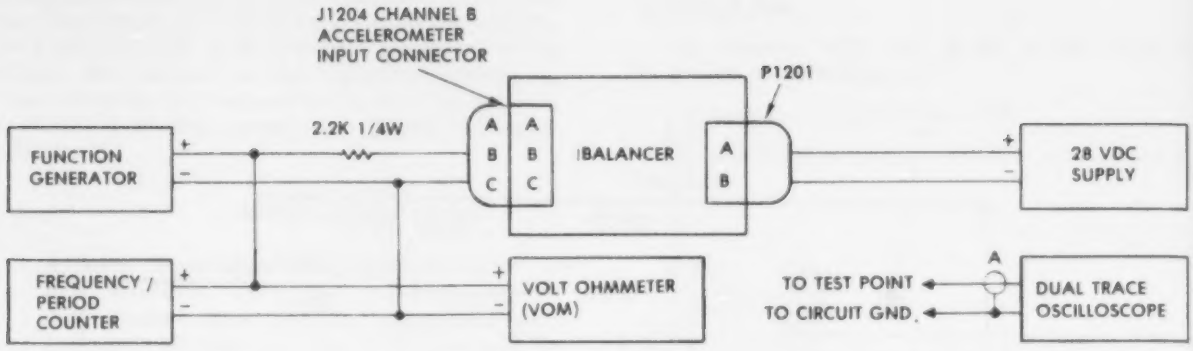

Figure 4-6. Balancer Test Setup

d. Functional Test.

(1) Connect Balancer and test equipment as shown in Figure 4-6.

(2) Set Balancer FUNCTION switch to B, R.P.M. RANGE switch to X10, and R.P.M. TUNE dial to 999.

(3) Connect oscilloscope to function generator output and set up function generator for a sine wave output of 166 Hz at 80 mV rms.

(4) Press and hold VERIFY TUNE switch and adjust frequency of function generator for a peak indication on IPS meter. Verify that frequency/peroid counter indicates 166.6 ± 3.3 Hz. Release VERIFY TUNE switch.

(5) Adjust output of function generator (do not change frequency) for a full scale indication on IPS meter. Verify that VOM indicates 115 mV ± 5%.

(6) Disconnect oscilloscope from function generator and set up oscilloscope to measure amplitude of signal at each test point listed in Table 4-3, Part A, and illustrated in Figure 4-5. Verify that oscilloscope indicationa correspond to Table 4-3.

(7) Set R.P.M. RANGE switch to X1.

(8) Connect oscilloscope to function generator and set function generator output to 16.66 Hz at 11.5 mV.

(9) Press and hold VERIFY TUNE switch and adjust frequency of function generator for peak indication on IPS meter. Verify that frequency/period counter indicates 16.66 ± 0.33 Hz. Release VERIFY TUNE switch.

(10) adjust output of function generator (do not change frequency) for a full scale indication on IPS meter. Verify that VOM indicates 11.5 mV ± 5%.

(11) Disconnect oscilloscope from function generator and set up oscilloscope to measure amplitude of signal at each test point listed in Table 4-3, Part B. Verify that oscilloscope indications correspond to Table 4-3.

(12) Set R.P.M. RANGE switch to X10 and R.P.M. TUNE dial to 100.

(13) Press and hold VERIFY TUNE switch and adjust frequency of function generator for a peak indication on IPS meter. Verify that frequency/period counter indicates 16.66 ± 0.33 Hz. Release VERILY TUNE switch.

(14) Adjust output of function generator (do not change frequency) for a full scale indication on IPS meter.

(15) Set up oscilloscope to measure amplitude of signal at each test point listed in Table 4-3, Part C. Verify that oscilloscope indications correspond to Table 4-3.

(16) If Functional tests indicate all circuits are functioning properly, peform adjustments in paragraph 4-20a to align balancer section.

(17) Replace cover and disconnect equipment.

Table 4-3. Balancer Test Point Measurements

Location	Peak-to-Peak (mV)
A	
TP1	285 to 315
TP8	285 to 315
TP12	76 to 84
TP11	95 to 105
TP2	95 to 105
TP14	475 to 525
TP13	570 to 630
TP3	2850 to 3105
B	
TP1	36 to 44
TP8	36 to 44
TP12	63 to 77
TP11	79 to 99
TP2	79 to 99
TP14	540 to 550
TP13	540 to 660
TP3	2700 to 3300
C	
TP1	30 to 40
TP8	30 to 40
TP12	63 to 77
TP11	810 to 990
TP2	81 to 99
TP14	450 to 550
TP13	5400 to 6600
TP3	2700 to 3300

NOTE: READING SPECIFIED ARE THE APPROXIMATE PEAK-TO-PEAK mV INDICATIONS EXPECTED NOT INTENDED FOR CALIBRATION PURPOSES.

4-12. Phazor Tests. These tests will determine the operational capability of the Phazor. Perform performance checks (a) thru (p) only when directed by troubleshooting procedure Table 4-17 or when applicble.

a. Perform Phazor resistance checks as applicable with Table 4-4. Figure 4-7 shows the location of Phazor test points.

b. Remove rear cover by removing four screws.

CAUTION

Disconnect +28 vdc power source before making resistance checks with multimeter.

Table 4-4. Phazor Power Supply Resistance Checks

From (+)	To (—)	Voltage
P1201 pin B	P1201 pin A (gnd)	4 to 6 k
P1201 pin A (gnd)	P1201 pin B	Greater than 1M
P1201 pin A	Circuit ground	0
TP1	Circuit ground	2 to 3 k
Chassis	Circuit ground	1 k

NOTE: RESISTANCE READINGS MAY DIFFER FROM THOSE SHOWN AS SEMICONDUCTORS EXHIBIT NONLINEAR RESISTANCE CHARACTERISTICS

c. Voltage Test.

(1) Connect +28 vdc power supply only to Balancer as shown in Figure 4-8.

(2) Use VOM to measure voltages at test points in Table 4-5.

Table 4-5. Phazor Voltage Checks

From (+)	To (—)	Voltage
TP1	Circuit ground	+10 ± 0.5 vdc
TP2	Circuit ground	+5 ± 0.3 vdc
TP3	Circuit ground	+0.2 ± 1.0 vdc
TP4	Circuit ground	+9 ± 1.0 vdc
TP5	Circuit ground	+9 ± 1.0 vdc
TP6	Circuit ground	+0 ± 0.5 vdc
TP7	Circuit ground	+9 ± 1.0 vdc
TP8	Circuit ground	+0.2 ± 0.5 vdc
TP9	Circuit ground	4.1 vdc

NOTE: CIRCUIT GROUND IS LOCATED R/H TERMINAL OF C-123

d. Sample Command Test.

(1) Connect Balancer and test equipment as shown in Figure 4-8.

(2) Set FUNCTION switch A, R.P.M. RANGE switch to X10, and INTERRUPTER LOGIC switch to SINGLE.

(3) Connect oscilloscope to function generator output and set up function generator for a square wave output of 600 mV peak-to-peak at 41.7 Hz ± 1 Hz.

(4) Disconnect oscilloscope from function generator and connect to TP3 (Figure 4-7). Verify that oscilloscope indication is a +5 volt spike at 41.7 Hz. (TEST switch depressed).

e. Phase-Lock Loop Tests.

(1) Connect Balancer and test equipment as shown in Figure 4-8.

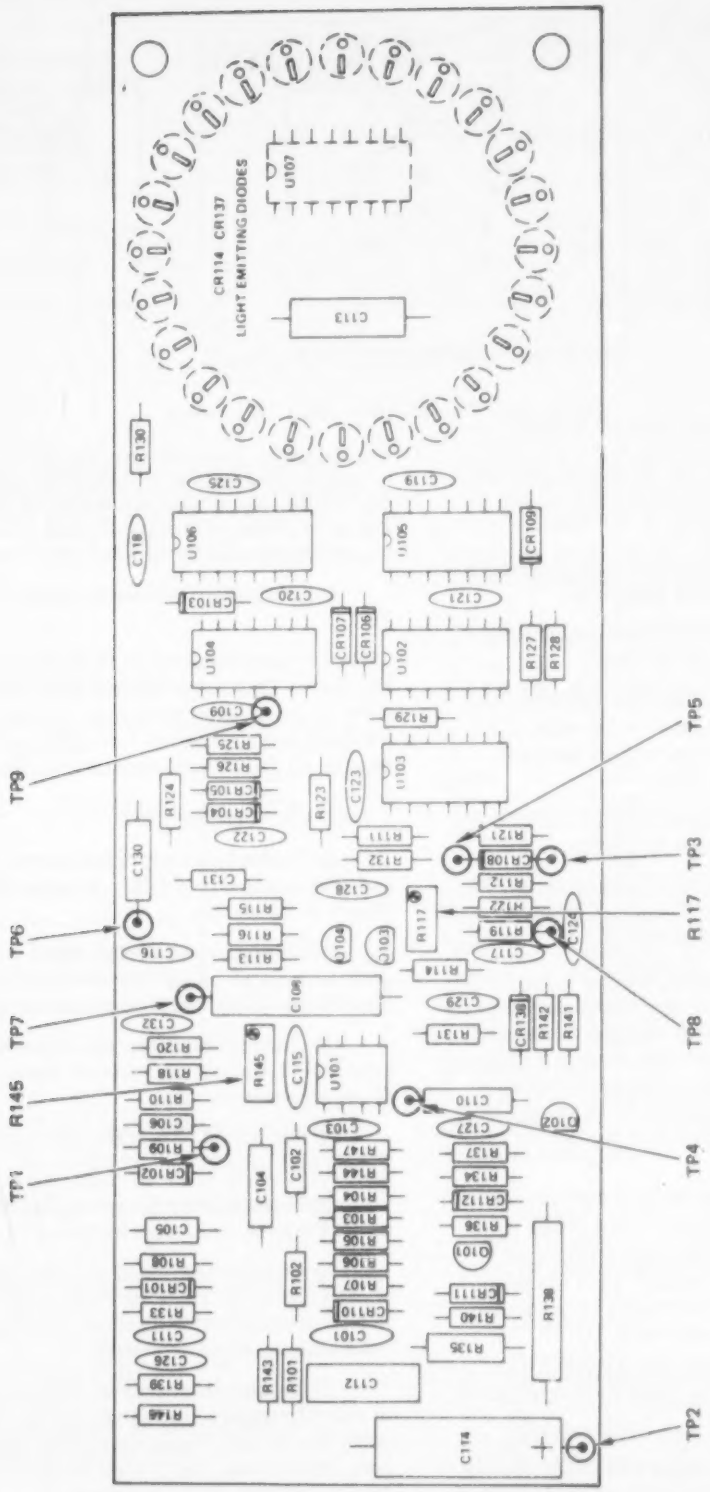

Figure 4-7. Phazor Test Points and Adjustments

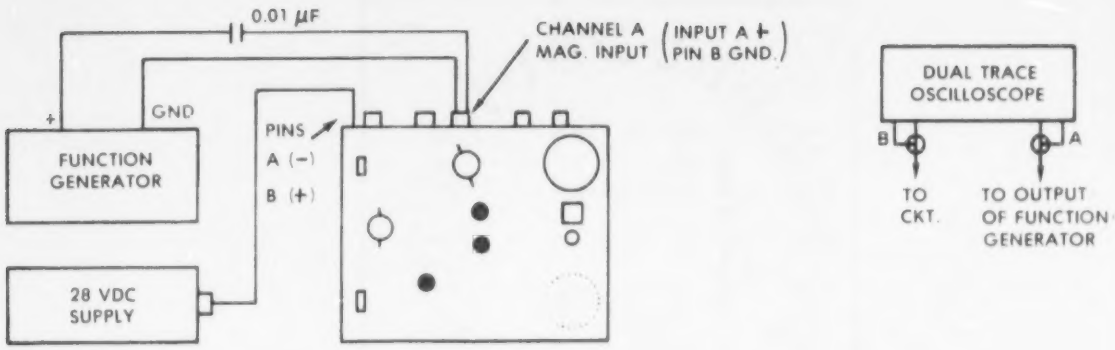

Figure 4-8. Phase - Lock Loop Test Setup

(2) Set FUNCTION switch to A, R.P.M. RANGE switch to X10, and INTERRUPTER LOGIC switch to SINGLE.

(3) Connect signal input A of function generator. Trigger oscilloscope from function generator.

(4) Set up function generator for a square wave output of 600 mV peak-to-peak at 41.7 Hz.

(5) Connect oscilloscope input B to TP4 (Fig. 4-7). Verify that oscilloscope indication is + 10 volts, ±1.0 vdc with a negative going pulse coincident with the square wave input rising edge.

(6) Connect oscilloscope input B to TP5 (Fig. 4-7). Verify that oscilloscope indication is similar to TP4.

(7) Set INTERRUPTER LOGIC switch to DOUBLE. Verify that pulses at TP5 disappear. Rest INTERRUPTER LOGIC switch to SINGLE.

(8) Connect oscilloscope input B to TP6. Verify that oscilloscope indication is 24 sawtooth ramp signals for each input square wave and that bottom of ramp is approximately +1.5 volts and peak is approximately +5 volts. The amplitude of the cycle prior to the positive- going edge of the square wave should be approximately 75% of the amplitude of the rest of the cycles.

(9) Connect oscilloscope input B to TP7 (Fig. 4-7). Verify that oscilloscope indication is +8 ±1 vdc with a 30 mV peak-to-peak triangle waveshape riding on it. The triangle wave and th input square wave are phased as follows: negative ramp of triangle simultancous with negative half of input square wave.

(10) Set frequency of function generator to 150 Hz. Verify that delevel at TP7 changes to 14 ±1 vdc.

(11) Connect oscilloscope input B of TP8 (Fig. 4-7). Set frequenty of function generator to 16 Hz. Verify that 5-volt square wave at TP8 is in phase with input square wave.

(12) Set frequency of function generator to 166 Hz. Verify that square wave at TP8 changes to 166 Hz and is in phase with input square wave in approximately 5 seconds.

(13) Connect oscilloscope input B to TP9 (Fig. 4-7).

(14) Set frequency of function generator to 55.5 Hz. Verify that wave from at TP9 is a 4-volt square wave at twice input frequency. Square wave is 0 volts for 3 ms and 4 volts for 6 ms. This two-to-one ratio ex ists for all frequencies from 16 to 166 Hz.

f. Counter-Decoder Tests.

(1) Add a second function generator to test setup and connect to CHANNEL A accelerometer input as shown in figure 4-9.

(2) Connect oscilloscope input A to function generator 2 and set up function generator 2 for a 55 Hz sine wave output at minimum output.

(3) Connect oscillosccope input B to function generator 1 and set up function generator 1 for a 55 Hz square wave output.

(4) Set R.P.M. RANGE switch to X10 and R.P.M. TUNE dial to 330.

(5) Increase output level of function generator 2 until IPS meter indicates between 0.2 to 0.5 IPS.

(6) Increase frequency of function generator 1 to slightly above 55 Hz until Phazor lamps step around in a counterclockwise direction in approximately 1 second with no skips or pauses.

(7) Change frequency of function generator 1 until rate of rotation is approximately one lamp per second. Verify that lamps illuminate approximately one lamp per second. Verify that lamps illuminate in sequence with no skips or pauses.

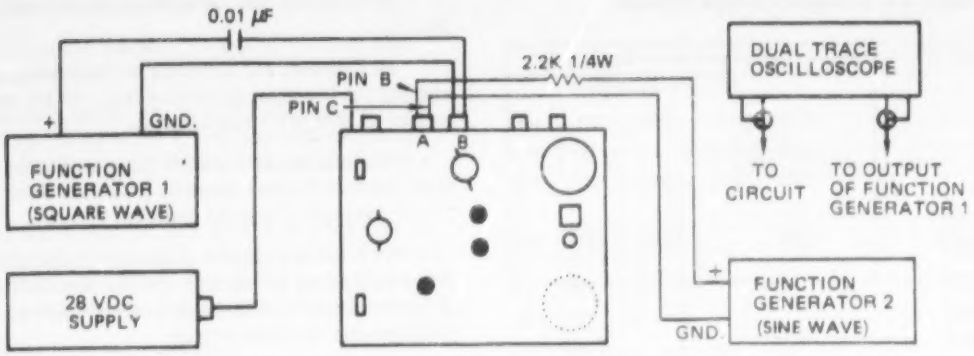

Figure 4-9. Counter-Decoder Test Setup

(8) **Refer to Table 4-6 and carefully adjust phase of function generator 1 relative to function generator 2. Verify that correct Phazor lamp is illuminated.**

(9) Replace cover and disconnect equipment.

Table 4-6. Decode and Display Verification

Aligned Signals		Illuminated Phazor Lamp
Square Wave	Sine Wave	
Positive Edge	Positive Peak	12:00 ± 1/2 hr
Positive Edge	Negative Peak	6:00 ± 1/2 hr
Positive Edge	Negative-going zero crossing	3:00 ± 1/2 hr
Positive Edge	Positive-going zero crossing	9:00 ± 1/2 hr

4-13. Strobex Tests. These tests will determine the operational capability of the Strobex. Perform performance checks (a) thru (d) only when directed by the troubleshooting procedure Table 4-17 or when applicable.

a. Remove six screws and lockwashers and pull rear cover out of case.

CAUTION

Disconnect +28 vdc power source before making resistance checks with a multimeter.

b. Perform Strobex resistance checks in accordance with Table 4-7. Figure 4-11 shows the location of Strobex test points.

Table 4-7. Strobex Resistance Checks

From (+)	To (-)	Resistance
J1201 pin A	J1201 pin B	Greater than 1M Pull trigger: 5 to 6 k
J1201 pin B	J1201 pin A	Greater than 1M Pull trigger: Greater than 1 M
TP1	TP2 (gnd)	1 to 2 k
TP3	TP2	1 to 2 k
TP4	TP2	1 to 2 k
TP6	TP2	50 to 100 k
TP7	TP2	10 to 15 k
TP8	TP2	20 to 30 k
TP9	TP2	3 to 5 k
TP10	TP2	Greater than 1 M
Circuit card pin 7	TP2	400 to 600 k
Circuit card pin 14	TP2	70 to 80 k
Rear edge of flash tube	TP2	1 M±10%

NOTE: RESISTANCE READINGS MAY DIFFER FROM THOSE SHOWN AS SEMICONDUCTORS EXHIBIT NON-LINEAR RESISTANCE CHARACTERISTICS

c. Voltage Test.

(1) Connect +28 vdc power supply only to Strobex as shown in Figure 4-10.

(2) Set MODE switch to A and RPM dial to 500.

(3) Use VOM to measure voltage at test points in Table 4-8 (Trigger pulled).

Table 4-8. Strobex Voltage Checks

From (+)	To (-)	Voltage
TP6	TP2 (gnd)	+290 ± 20 vdc
TP7	TP2 (gnd)	+ 12 ± 1.2 vdc
TP10	TP2 (gnd)	+290 ± 20 vdc
Rear end of flash tube	TP2	+290 ± 20 vdc

(4) Connect test equipment as shown in Figure 4-10.

(5) Connect oscilloscope to function generator and set up function generator for a 40 Hz square wave output of 800 mV peak-to-peak.

(6) Squeeze and hold trigger on Strobex. Verify that Strobex flashes steadily and that flash rate is 40 Hz on frequency/period counter.

(7) Reduce function generator output until Strobex flashes erratically. Verify that function generator output is 600 mV peak-to-peak or less on oscilloscope. Release trigger.

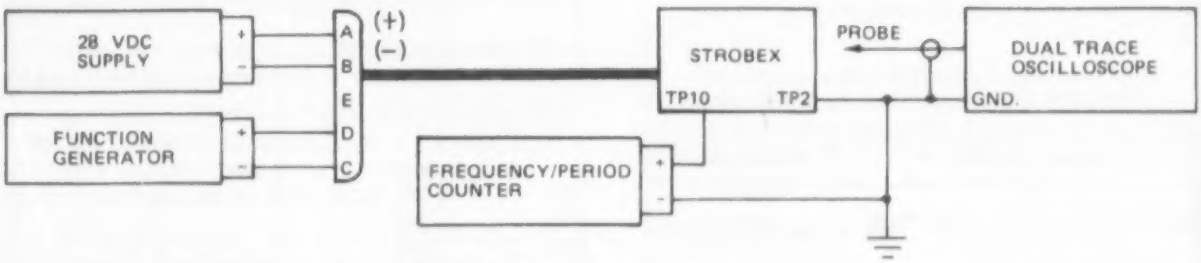

Figure 4-10. Strobex Test Setup

d. Oscillator Frequency Test.

(1) Disconnect frequency/period counter and function generator.

(2) Connect oscilloscope to TP10 (Fig. 4-11). Set up oscilloscope to sync on EX 60 Hz source and to measure a 400-volt signal with a 2 ms/division time base.

(3) Set RPM dial MODE switch to positions indicated in Table 4-9. At each setting, adjust RPM dial to sync oscilloscope. Verify that RPM dial indicates value listed in Table 4-9 after syncing.

e. Testing of Locking Oscillator.

(1) Connect Strobex and test equipment as shown in Figure 4-10.

(2) Connect oscilloscope to function generator and set up oscilloscope to trigger from positive edge of function generator output.

NOTE

Sync may be found at more than one point at each setting.

RPM dial	MODE switch	Synced RPM dial
180	D	171 to 189
360	D	342 to 378
540	D	513 to 567
720	D	684 to 756
900	D	855 to 945
720	C	684 to 756
720	B	684 to 756

Table 4-9. Strobex Oscillator Frequency Check

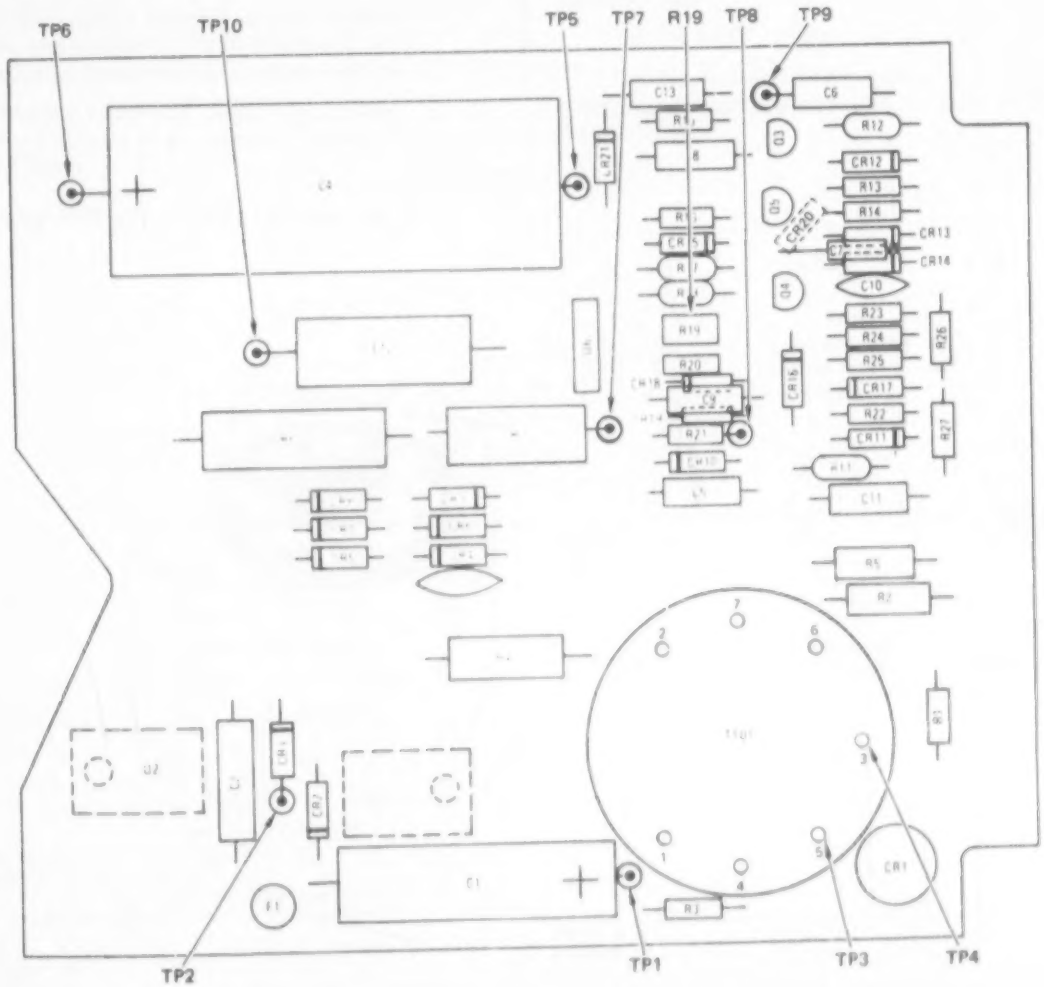

Figure 4-11. Strobex Test Points and Adjustments

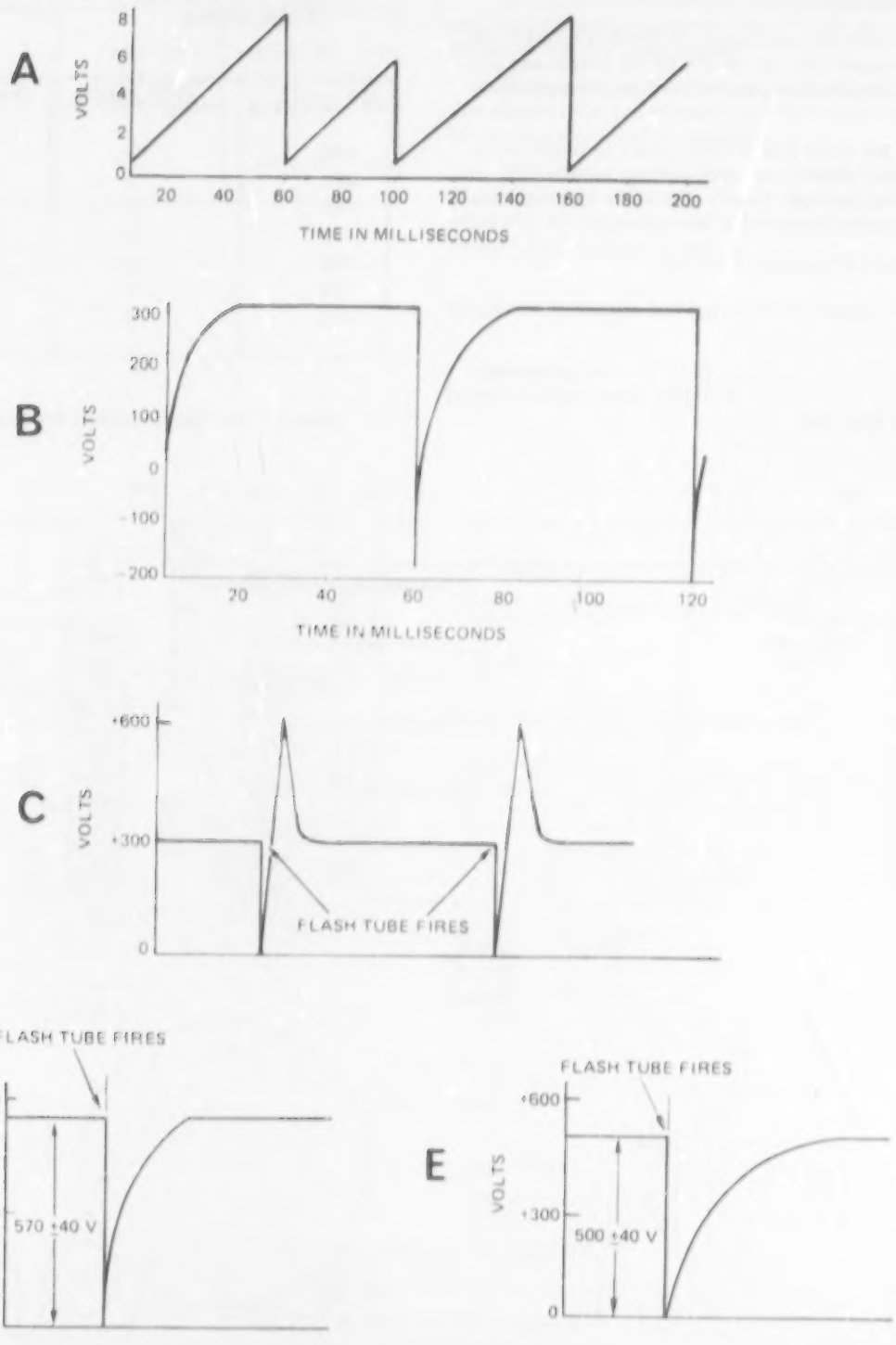

Figure 4-12. Strobex Waveforms

(3) Set function generator output to 10 Hz at 1 volt peak-to-peak.

(4) Set MODE switch to B and RPM dial to 395.

(5) Disconnect oscilloscope from function generator and connect to TP9 (Fig. 4-11).

(6) Squeeze and hold trigger. Verify that oscilloscope display is as shown in figure 4-12A. The ramp which fires at 60 ms is the oscillator; the ramp which fires at 100 ms is the square wave input signal (10 Hz = 100 ms). Release trigger.

f. Testing of Trigger Circuit.

(1) Connect Strobex and test equipment as shown in figure 4-10.

(2) Connect oscilloscope to function generator and set up oscilloscope to trigger from positive edge of function generator output.

(3) Set MODE switch to D and RPM dial to 100.

(4) Disconnect oscilloscope from function generator and connect to TP10 (Fig. 4-11). Set oscilloscope to internal trigger, negative slope.

(5) Squeeze and hold trigger. Verify that oscilloscope display is as shown in figure 4-12B. Release Trigger.

g. Testing of High-Low Intensity Function.

(1) Disconnect frequency/period counter and function generator.

(2) Set MODE switch to D and RPM TUNE dial to 500.

(3) Connect oscilloscope to rear terminal of C1201 (22, fig. C-5) large capacitor at rear of case.

(4) Squeeze and hold trigger. Verify that oscilloscope display is as shown in figure a4-12C. Release trigger.

(5) Set MODE switch to C.

(6) Squeeze and hold trigger. Verify that oscilloscope display is within 1 volt of ground. Release trigger.

(7) Connect oscilloscope to junction of CR1203 (31, fig. C-5) and L1202 (34) (Fig. C-5).

(8) Set MODE switch to D.

(9) Squeeze and hold trigger. Verify that oscilloscope display is as shown in figure 4-12D. Release trigger.

(10) Set MODE switch to C.

(11) Squeeze and hold trigger. Verify that oscilloscope display is as shown in figure 4-12E. Release trigger.

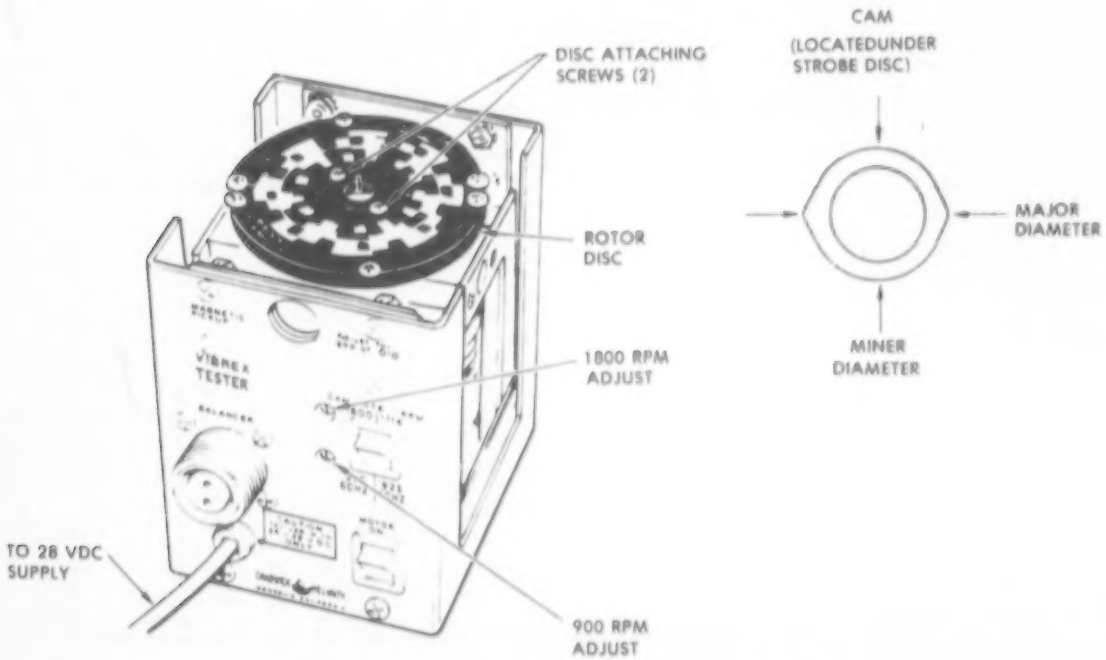

Figure 4-13. Tester Test Setup

(12) Replace cover and disconnect equipment.

4-14. Tester Test. This test will determine operational capability of the Tester. Perform performance checks 4- 14a thru h only when directed by the troubleshooting procedure Table 4-17 or when applicable.

NOTE

Use of the Tester requires a facility illuminated by 50 or 60 Hz fluorescent lights to verify that the Tester is rotating at the exact speed required. These instructions assume 60 Hz power for the lights. Step e explains the differences when using 50 Hz illumination.

CAUTION

Do not connect the Tester to any voltage other than *+28* vdc or it will damage the unit.

a. Connect Tester to +28 vdc supply.

b. Set MOTOR switch to ON. Verify that motor turns freely and that no grinding noises are evident.

c. Set CAM RATE (RPM) switch to 1800/1714. Verify that black and white outer ring of segments on rotor disc appear to be stopped when illuminated by 60 Hz fluorescent room lights. If segments are not stopped, adjust 1800 rpm adjustment until outer ring of black and white segments appear to be stopped.

d. Set CAM RATE (RPM) switch to 900. Verify that second ring of black and white segments on rotor disc appear to be stopped. If segments are not stopped, adjust 900 rpm adjustment until second ring of black and white segments appear to be stopped.

e. Adjustment with 50 Hz power source for the fluorescent lights is the same as for 60 Hz with the following exception: The Tester rotor disc speed is adjusted using the two inner rings of black and white segments. Verify that third ring from outside appears stopped when rotor disc is turning at 1714 rpm. Verify that inner ring (fourth from outside) appears stopped when strobe disc is turning at 923 rpm.

f. Set MOTOR switch to OFF.

g. Remove two screws and remove rotor disc. Use a precision micrometer caliper to measure difference between major and minor diameters of cam (Fig. 4-13). Verify that difference is between 0.0166 and 0.0174 inch.

h. Install a Magnetic Pickup. Verify that rotor disc screws (7, Fig. C-7) pass easily over the top of the Magnetic Pickup with no binding or sticking.

4-15. Accelerometer and Magnetic Pickup.

a. Accelerometer. These tests will determine the operational capability of the Accelerometer and Accelerometer Cables. Refer to Figures 4-14 & 4-15 for schematic diagrams of the Accelerometer and Accelerometer Cables and perform resistance checks in accordance with Table 4-10 & 4-11, respectively.

Table 4-10. Accelerometer 4177B Resistance Checks

From (+)	To (–)	Resistance
Pin A	Pin B	2 to 3 k
Pin A	Pin C	More than 1 M
Pin B	Pin C	More than 1 M
Pin A, B, or C	1/4-28 stud	More than 10 M

Table 4-11. Accelerometer Cables A4296-1 and A4296-2 Resistance Checks

From (+)	To (–)	Resistance
Pin A (male end)	Pin A (female end)	Less than 1 ohm
Pin B (male end)	Pin B (female end)	Less than 1 ohm
Pin C (male end)	Pin C (female end)	Less than 1 ohm
Shell (male end)	Pin A, B, or C	More than 10 M
Shell (female end)	Pin A, B, or C	More than 10 M
Pin A (male end)	Pin B (male end)	More than 10 M

Table 4-11. Accelerometer Cables A4296-1 and A4296-2 Resistance Checks - Continued

From (+)	To (–)	Resistance
Pin B (male end)	Pin C (male end)	More than 10 M
Pin A (male end)	Pin C (male end)	More than 10 M

b. Magnetic Pickup. These tests will determined the operational capability of the Magnetic Pickup and Magnetic Pickup Cable. Refer to Fig. 4-15 for a schematic diagram of the Magnetic Pickup Cable and perform resistance checks in accordance with tables 4-12 & 4-13, respectively.

Table 4-12. Magnetic Pickup 3030AN Resistance Checks

From (+)	To (–)	Resistance
Pin A	Pin B	1 k 10%
Shell	Pin A or B	More than 10 M

Table 4-13. Magnetic Pickup Cable A3319-2 Resistance Checks

From	To	Resistance
Pin A (male end)	Pin A (female end)	Less than 1 ohm
Pin B (male end)	Pin B (female end)	Less than 1 ohm
Shell (male end)	Pin A or B	More than 10 M
Shell (female end)	Pin A or B	More than 10 M
Pin A (male end)	Pin B (male end)	More than 10 M

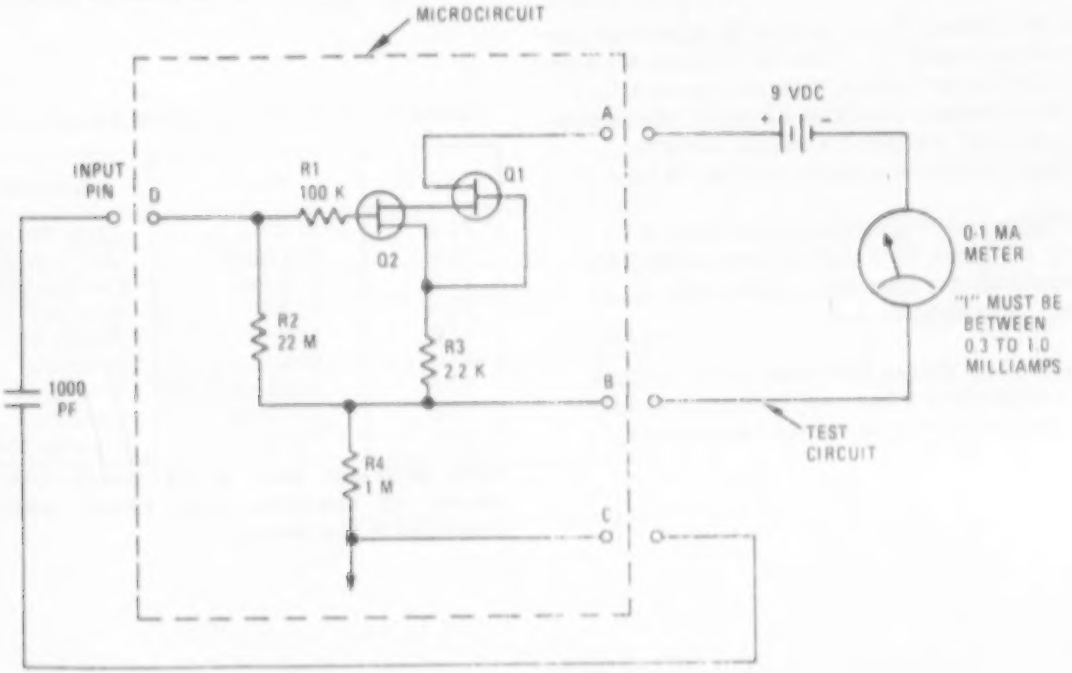

Figure 4-14. Accelerometer 4177B, Schematic Diagram

Table 4-14. DC Cables Resistance Checks

From (+)	To (–)	Resistance
DC Extension Cable A3529		
Pin A (male end)	Pin A (female end)	Less than 1 ohm
Pin B (male end)	Pin B (female end)	Less than 1 ohm
Shell (male end)	Pin A or B	More than 10 M
Shell (female end)	Pin A or B	More than 10 M
Pin A (male end)	Pin B (male end)	More than 10 M
DC Adapter Cable B3140-1		
Silver pin (male end)	Pin A (female end)	Less than 1 ohm
Gold pin (male end)	Pin B (female end)	Less than 1 ohm
Shell (male end)	Pin A or B	More than 10 M
Shell (female end)	Pin A or B	More than 10 M
Pin A (female end)	Pin B (female end)	More than 10 M
DC Adapter Cable B3140-5		
Black clip	Pin A (female end)	Less than 1 ohm
Red clip	Pin B (female end)	Less than 1 ohm
Shell (female end)	Pin A or B	More than 10 M
Pin A (female end)	Pin B (female end)	More than 10 M
DC Adapter Cable B3140-9		
Pin A (female end)	Lamp Shell	Less than 1 ohm
Pin B (female end)	Lamp center conductor	Less than 1 ohm
Shell (female end)	Pin A or B	More than 10 M
Pin A (female end)	Pin B (female end)	More than 10 M

4-16. DC Cables. These tests will determine the operational capability of the DC Extension Cable and DC Adapter Cables. Refer to figures 4-15 + 4-16 for schematic diagrams of the DC Extension Cable and DC Adapter Cables an perform resistance checks in accordance with Table 4-14.

4-17. Balancer. Wiring Checkout. Refer to figures FO-1 and FO-2 and perform additional resistance checks from the circuit cards to related components.

4-18. Strobex Wiring Checkout. Refer to figure FO-3 and perform additional resistance checks from the circuit card to related components.

Table 4-15. Signal Simulator B4305 Resistance Checks

From (+)	To (–)	Resistance
P1-A	P1-B	300 to 360 ohms
P1-A	P1 (Shell)	300 to 360 ohms
P1-B	P1 (Shell)	Less than 1 ohm
P2-A	P2-B	50 to 56 k
P2-B	P2-C	2.0 to 2.4 k
P2-A	P2-C	50 to 56 k
P2-A	P2 (Shell)	50 to 56 k
P2-B	P2 (Shell)	2.0 to 2.4 k
P2-C	P2 (Shell)	Less than 1 ohm

NOTE: RESISTANCE READINGS MAY DIFFER FROM THOSE SHOWN AS SEMICONDUCTORS EXHIBIT NON-LINEAR RESISTANCE CHARACTERISTICS.

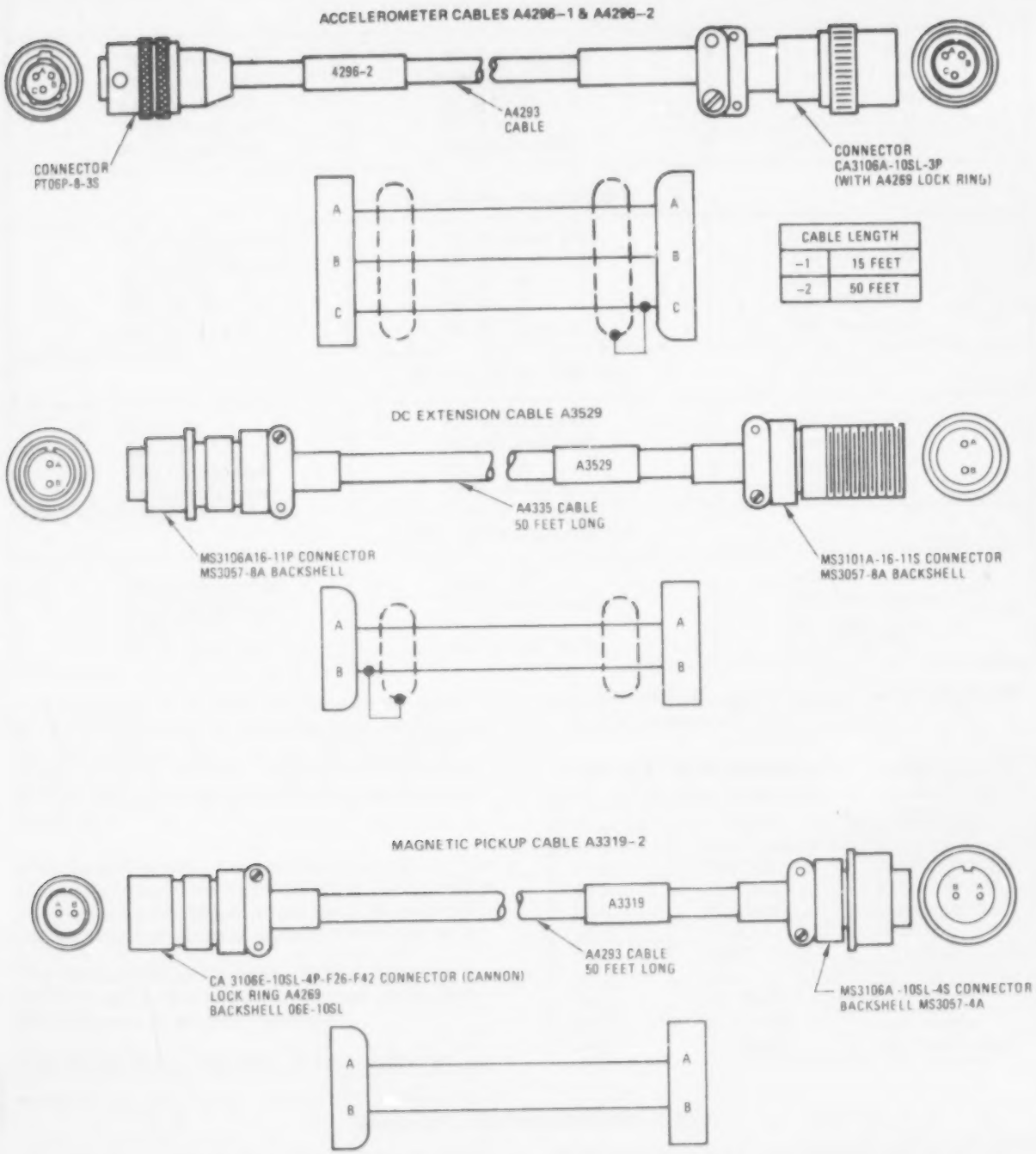

Figure 4-15. *Cables A4296-1, A4296-2, A3529, and A3319-2*

Table 4-11. DC Cables Resistance Checks

From (+)	To (–)	Resistance
DC Extension Cable A3529		
Pin A (male end)	Pin A (female end)	Less than 1 ohm
Pin B (male end)	Pin B (female end)	Less than 1 ohm
Shell (male end)	Pin A or B	More than 10 M
Shell (female end)	Pin A or B	More than 10 M
Pin A (male end)	Pin B (male end)	More than 10 M
DC Adapter Cable B3140-1		
Silver pin (male end)	Pin A (female end)	Less than 1 ohm
Gold pin (male end)	Pin B (female end)	Less than 1 ohm
Shell (male end)	Pin A or B	More than 10 M
Shell (female end)	Pin A or B	More than 10 M
Pin A (female end)	Pin B (female end)	More than 10 M
DC Adapter Cable B3140-5		
Black clip	Pin A (female end)	Less than 1 ohm
Red clip	Pin B (female end)	Less than 1 ohm
Shell (female end)	Pin A or B	More than 10 M
Pin A (female end)	Pin B (female end)	More than 10 M
DC Adapter Cable B3140-9		
Pin A (female end)	Lamp Shell	Less than 1 ohm
Pin B (female end)	Lamp center conductor	Less than 1 ohm
Shell (female end)	Pin A or B	More than 10 M
Pin A (female end)	Pin B (female end)	More than 10 M

4-16. DC Cables. These tests will determine the operational capability of the DC Extension Cable and DC Adapter Cables. Refer to figures 4-9 and 4-10 for schematic diagrams of the DC Extension Cable and DC Adapter Cables and perform resistance checks in accordance with table 4-11.

4-17. Signal Simulator. These tests will determine the operational capability of the Signal Simulator. Refer to figure 4-11 for a schematic diagram of the Signal Simulator and perform resistance checks in accordance with table 4-12.

4-18. Balancer Wiring Checkout. Refer to figures FO-1 and FO-2 and perform additional resistance checks from the circuit cards to related components.

4-19. Strobex Wiring Checkout. Refer to figure FO-3 and perform additional resistance checks from the circuit card to related components.

Table 4-12. Signal Simulator B4305 Resistance Checks

From (+)	To (–)	Resistance
P1-A	P1-B	300 to 360 ohms
P1-A	P1 (Shell)	300 to 360 ohms
P1-B	P1 (Shell)	Less than 1 ohm
P2-A	P2-B	50 to 56 k
P2-B	P2-C	2.0 to 2.4 k
P2-A	P2-C	50 to 56 k
P2-A	P2 (Shell)	50 to 56 k
P2-B	P2 (Shell)	2.0 to 2.4 k
P2-C	P2 (Shell)	Less than 1 ohm

Section III. REPAIR PROCEDURES

4-20. Removal and Disassembly. The complete disassembly of VIBREX components; i.e., circuit cards, transformers, switches, etc., is not authorized at this maintenance level. After performing the troubleshooting procedures in paragraphs 4-10 through 4-19, perform the removal and disassembly procedures in the following paragraphs. Disassemble only to extent necessary to accomplish repairs.

4-21. Disassembly of Balancer. Disassembly instructions consist of removal and replacement of the meter. Remove the meter as follows (fig. 4-12):

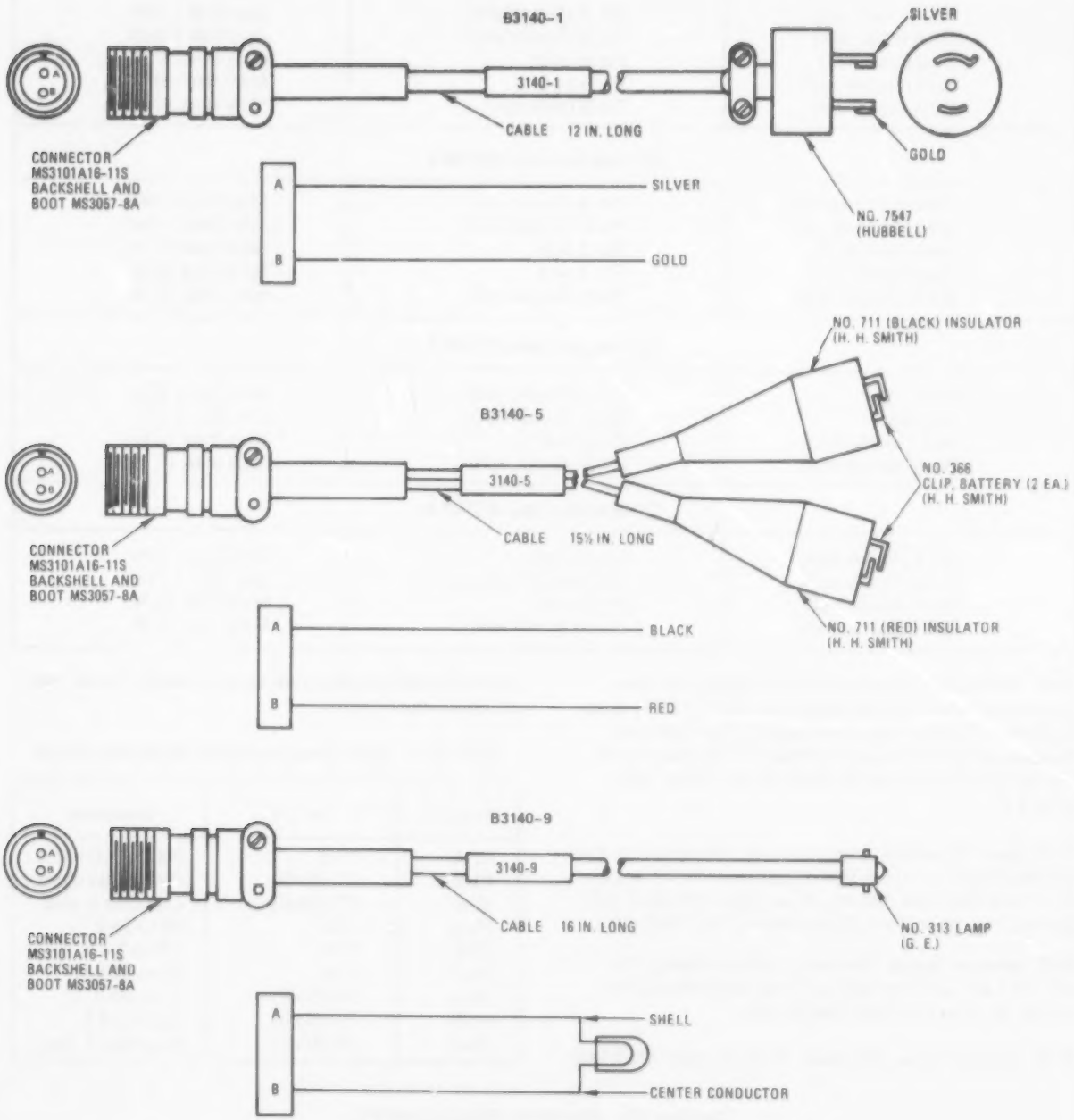

Figure 4-10. DC Adapter Cables B3140-1, B3140-5, and B3140-9

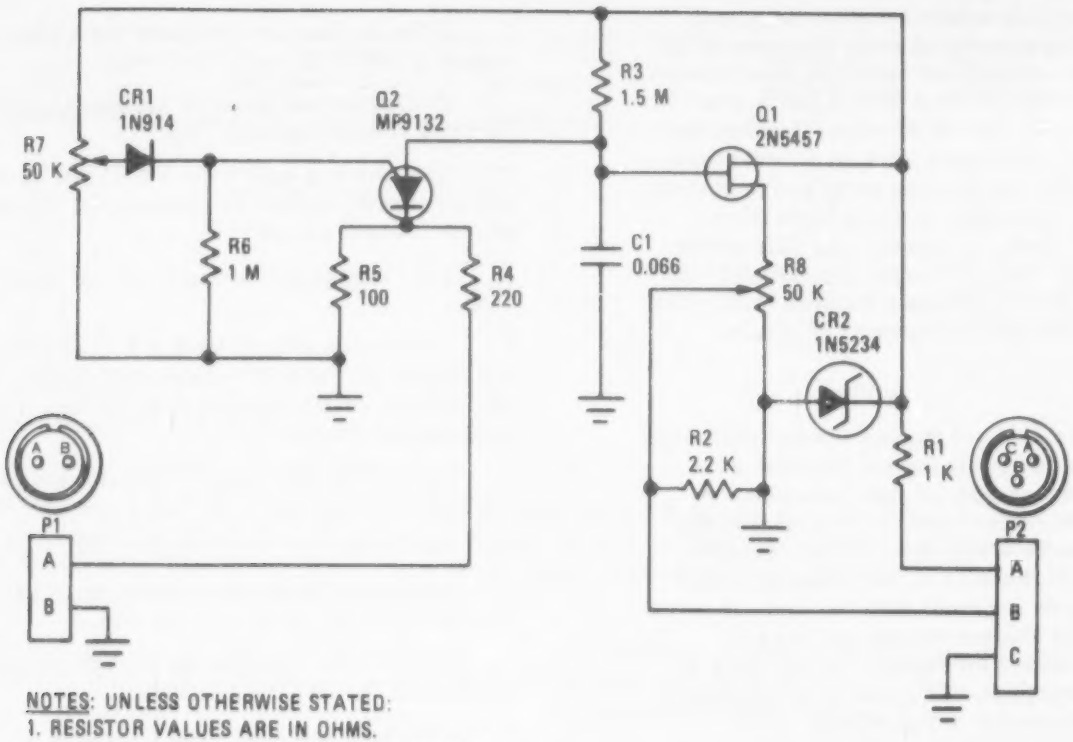

Figure 4-16. Signal simulator B4305, Schematic Diagram

4-19. Signal Simulator Tests. These tests will determine operational capability of the signal simulator.

a. Refer to figure 4-17 for schematic diagram and Table 4-15 for resistance checks as necessary.

b. Perform Signal simulator check below:

(1) Connect DC Power Supply (+) Positive lead to connector P2 pin A, and (—) Negative lead to connector P2 pin C.

(2) Connect oscilloscope leads from channel A input to connector Pin B, and channel B input to connector P1 pin A.

(3) Adjust power supply for +9VDC. Observe that channel A wave form is an exponential sawtooth with a period of 110 mS, ± 5% with an amplitude of 90 mV peak-to-peak ± 5%.

(4) Channel B wave from shall be a short pulse occuring at the negative stage of channel A sawtooth, with an amplitude of 2.5V± 10%.
Add: Entire page as shown on draft. Third sentence in first note should read: "Do not exceed 40 watts."

NOTE

Soldering Techniques. Use a stiff, non-metallic bristle brush to clean anti-fungus material away from area to be unsoldered and soldering iron between 25 and 40 watts (600 to 900 degrees F). Do not exceed 40 watts. Use desoldering equipment, such as a solder sucker, while unsoldering parts and heat sinks on transistor or diode leads when soldering or unsoldering. Use solder per Federal Specification QQ-S-571D. Apply anti-fungus material (MIL-STD-1250) after completion of repairs.

NOTE

Circuit Card Repair. Special soldering equipment is needed for solid state components; i.e., microcircuits, transducers and semiconductors that can be easily damaged by excessive heat. Repairs to the Balancer circuit cards are made with the cards in place. The Strobex circuit card may be removed for repair. The following instructions, and those in the preceding paragraph, are applicable to the Balancer circuit cards and the Strobex circuit card.

4-20. Adjustment Procedures. Perform these procedures only when directed by the troubleshooting procedure (Table 4-17), or paragraph 4-11d (16).

a. Balancer Adjustments. Perform these procedures only when directed by the troubleshooting procedures (Table 4-17), or paragraph 4-11d (16).

(1) Connect Balancer and test equipment as shown in Figure 4-6.

(2) Set Balancer FUNCTION switch to TRACK, R.P.M. RANGE switch to X10, and R.P.M. TUNE dial to 100.

(3) Remove cover by removing 4 screws.

(4) Connect VOM between TP2 and ground, and adjust R152 for a 0±3 mV indication.

(5) Connect VOM between TP3 (Fig. 4-5) and ground, and adjust R152 for a 0 ±3 mV indication.

(6) Set FUNCTION switch to B and R.P.M. TUNE dial to past 999 to 000.

(7)Set up function generator for a sine wave output of 166.67 Hz at 115 mV rms.

(8) Connect oscilloscope horizontal input to TP8 and vertical input to TP2.

(9) Press and hold VERIFY TUNE switch and adjusat R114 for a 90° phase shift display (circle). Release switch.

(10) Connect oscilloscope vertical input to TP3.

(11) Press and hold VERIFY TUNE switch and adjust 135 for a 90° phase shift display (circle). Release switch. Repeat steps (9) thru (11) for optimum adjustment.

(12) Adjust R155 until IPS meter indicates full scale.

(13) Set R.P.M. TUNE dial to 100.

(14) Set up function generator for a 16.67 Hz sine wave output at 11.5 mV rms.

(15) Connect oscilloscope horizontal input to TP8 and vertical input to TP2.

(16) Press and hold VERIFY TUNE switch and adjust R126 for a 90° phase shift display (circles). Release switch.

(17) Connect oscilloscope vertical input to TP3.

(18) Press and hold VERIFY TUNE switch and adjust R148 for a 90° phase shift display (circles). Release switch. Repeat steps (16) thru (18) for optimum adjustment.

(19) Position Balancer and function generator controls as indicated in Table 4-16. Observe readings as in dicated in Table 4-16 (See note below Table.)

(20) Disconnect equipment and replace cover.

b. Phazor Adjustments. Perform these procedures only when directed by the troubleshooting procedures (Table 4-17).

(1) Connect Balancer and test equipment as shown in Figure 4-8.

(2) Set FUNCTION switch to A, R.P.M. RANGE switch to X10, and INTERRUPTER LOGIC switch to SINGLE.

Table 4-16. Balancer Adjustments

RPM Range Switch	RPM Tune Dial	IPS Meter Indication	Function Generator HZ	Digital Multimeter MV
X1	500	1.0	8.33	5.9 *
X1	000 (Full CW)	1.0	16.67	11.8
X10	100	1.0	16.67	11.8
X10	500	1.0	83.33	59
X10	000 (Full CW)	1.0	166.67	118
X100	100	1.0	166.67	118
X100	500	1.0	833.33	590
X100	000 (Full CW)	1.0	1666.7	1.15V

* Could be off 30% due to low frequency

NOTE: Frequency and MV readings may vary as much as ± 5% on test equipment listed above for different units tested to obtain 1.0 IPS on meter. Table 4-16 will indicate approximate indications expected. If one range is way out, one or more of the intergrating capacitors C106 thru C117 could be faulty if 1.0 cannot be obtained on IPS meter.

(3) Set up function generator for a square wave output of 600 mV peak-to-peak at 41.7 Hz. Use oscilloscope inut A to measure signal.

(4) Remove cover by removing four screws.

(5) Connect oscilloscope input B to TP6 (Fig 4-7).

(6) Adjust R117 (Fig. 4-7) until peak of sawtooth ramp is 5 volts above ground. Bottom of ramp is approximately 1.5 volts above ground.

(7) Observe that there are 24 sawtooth ramps for each input square wave.

(8) Adjust R145 so that the last ramp prior to the positive-going edge of the square wave is 75% of the height of the other 23 sawtooth ramps.

(9) Disconnect Equipment and Replace Cover.

c. Strobex Adjustments. Perform this procedure only when directed by the Troubleshooting procedures (Table 4-17).

(1) Remove Cover.

(2) Connect + 28 vdc power suppply to Strobex. (Figure 4-10).

(3) Set Strobex MODE switch to D and RPM dial to 360.

(4) Connect oscilloscope to TP10 (Fig 4-11). Set-up oscilloscope to Sync on EX 60 Hz source and to measure a 400 volt signal with a 2mS/division time base.

(5) Squeeze and hold trigger and adjust R19 (Fig 4-11) until oscilloscope wave shape is synced.

(6) Disconnect equipment and replace cover.

Table 4-17. Troubleshooting Procedures (Balancer/Phazor)

Para/Step	Trouble	Probable Cause	Probable Remedy
3-8a	Perform Signal Signal Simulator Field Operational Checkout before Performing troubleshooting procedure		
3-8a(2)	Phazor Lamp not illuminated	1. Polarity of +28 vdc is wrong	1. Change Polarity; pin B to (+), pin A to (-)
		2. Fuse on Balancer card blown	2. Remove cover and replace fuse F101 (Fig 4-5)
3-8a(5)	12:00 O'clock Lamp not illuminated	1. Interrupter Logic switch incorrectly set	1. Check and reset switch to proper position
		2. Defective Phazor Card	2. Perform Phazor Tests (Para 4-12)
3-8a(8), (9), (11), (12)	Improper Indications	Defective Balancer Card	Perform Balancer Tests (Para 4-11)
	Balancer-Section		
4-11c(3)	Improper Voltages (Table 4-2)	Defective Components	1. Associated components (Fig FO-1, Sheet 1 & 2) and Perform Para/Step as required
	Improper Voltage at TP5	+9 vdc Power Supply Defective	2. Q104 and Q105 (Fig 4-5) and associated Components (Fig FO-1, Sheet 2)
	Improper Voltage at TP6	-9 vdc Power Supply Defective	3. Q101, Q102, Q103, (Fig 4-5) and associated components (Fig FO-1, Sheet 2)
4-11d(4) (5)(9) (10) (13)	Improper Indications	Meter Circuit or Associated Cmponents (Perform 4-11d(6), (11), (15) below if trouble not corrected)	1. U108 (Fig 4-5), 1201 (17) (Fig C-2), and associated components (Fig FO-1, Sheet 2)
4-11d (6) (11), (15)	Improper Voltage at TP1	Accelerometer Input B Circuit Defective	2. U110 (Fig 4-5) and associated components (Fig FO-1, Sheet 2)

Table 4-17. Troubleshooting Procedures (Balancer/Phazor) (Continued)

Para/Step	Trouble	Probable Cause	Probable Remedy
		Balancer-Section (Continued)	
4-11d(6), (11), (15)	Improper Voltages at TP8	Accelerometer Input A Circuit Defective	1. U107 (Fig 4-5), S1201,(29 Fig C-2) and associated components (Fig FO-1, Sheet 1)
	Improper Voltages at TP12, TP11, TP2, TP14, TP13, TP3	Filter Loop Circuit Defective or Misadjusted	2. U101 through U106 (Fig 4-5), S1204 (30 Fig C-2) and associated components (Fig FO-1, Sheet 1).
4-11d (16)			3. Adjust Balancer (Para 4-20a) as necessary.
		Phazor-Section	
4-12c(2)	Improper Voltages Table 4-5	Defective Components	1. Associated components (Fig FO-2) and Perform as required Para/Step below.
	Improper Voltage at TP1	+10 vdc Power Supply Defective	2. Q101 (Fig 4-7) and associated components (Fig FO-2).
	Improper Voltage at TP2	+5 vdc Power Supply Defective	3. Q101 (Fig 4-7) and associated components (Fig FO-2). If voltage too high check U101 through U107 (Fig 4-7).
4-12d(4)	Improper Indications at TP3	Sample Command Circuit	U102, U103, (Fig 4-7). U108, U109 (Fig 4-5) and assiciated components (Fig FO-1, Sheet 2, and Fig FO-2).
4-12e(5)	Improper Indications at TP4	Phase-Lock Loop Defective (Magnetic Pickup Input Circuit)	U101 (Fig 4-7) and assiciated components (Fig FO-2).

Table 4-17. Troubleshooting Procedures (Balancer/Phazor) (Continued)

Para/Step	Trouble	Probable Cause	Probable Remedy
		Phazor-Section (Continued)	
4-12e(6)	Improper Indications at TP5	Phase-Lock Loop Defective (Double Pulse Detector Circuit)	U103 (Fig 4-7), S1205 (32, Fig C-2) and assosciated components (Fig FO-2).
4-12e(8), (9), (10), (11), (12), (13), (14)	Improper Indications at TP6 through TP9	Phase-Lock Loop Defective or Misadjusted	U101 through U105, Q103 and Q104 (Fig 4-7) and associated components (Fig FO-2). Adjust Phazor (Para 4-20b) if necessary.
4-12f(6), (7), (8)	Improper Indications	Counter-Decoder Defective	U102 through U107 (Fig 4-7) and associated components (Fig FO-2).

Table 4-18. Troubleshooting Procedures (Strobex/Tester)

Para/Step	Trouble	Probable Cause	Probable Remedy
4-13c (3)	Improper Voltages Table 4-8	Defective Components	Associated components (Fig C-5) and Perform Para 4-13 as required or Para/Step below
4-13c (6), (7)	Improper Voltage at TP6	Fuse F1 blown	1. F1 Fuse (Fig 4-11)
		High Voltage Power Supply Defective	2. Q1, Q2, Q6 (Fig 4-11) A501, S501 (24, 11, Fig C-5) and associated components (Fig F0-3)
	Improper Indications	Oscillator Defective	Q4 (Fig 4-11), A501 (24, Fig C-5) and associated components (Fig FO-3)
4-13d (3), e(5), f(5), g(4). (6), (9), (11)	Improper Indications at TP9, TP10, Rear Terminal C1201; Junction of CR1203 and L 1202	Oscillator Defective or Misadjusted	Q3, Q5 (Fig 4-11), S501B (11 Fig C-5) and associated components (Fig F03). Adjust Strobex (Para 4-20c)as necessary.
		Tester-Section	
4-14a	Perform 4-14a to Determine Operational Capability of Tester		
4-14b	Motor does not run	Blown Fuse or Defective Motor	F101 Fuse (39 Fig C-7), Motor B1 (28 Fig C-7) or associated components (Fig C-7).
	Grinding Noise	Cam follower rubs against profile cam	Adjust set screw (11 Fig C-7).
4-14g	Profile cam out of tolerance	Worn profile cam	1. Replace profile cam (12, Fig C-7).
		Rotor hub screws rubs against motor	2. Loosen set screw (11, Fig C-7) and adjust height of rotor hub and rotor disc as required.
4-14h	Rotor Disc hits Magnetic Pickup	Rotor disc improperly set	Same as above 4-14g (2).

4-21. Disassembly of Balancer (Fig. C-2).

a. Remove rear cover (1) by removing four screws (2) and sliding cover off of chassis (51).

b. Remove IPS meter M1201 (17) as follows:

(1) Disconnect red and black leads from meter.

(2) Remove three screws (18), washers (19), and nuts (20) attaching meter to case. Remove meter (17) from chassis (51).

c. Remove R.P.M. TUNE potentiometer R1201 (21) as follows:

(1) Tag leads for identification and unsolder from R1201.

(2) Pull knob, part of (27), from front panel.

(3) Remove R1201 (21), 10-turn dial (27), and bracket (26) by removing two screws (23), washers (24), nuts (25), and springs (22).

(4) Loosen two sesetscrews holding 10-turn dial (27) to shaft of R1201 (21) and separate 10-turn dial from R1201.

NOTE

The two circuit cards (8 and 12) are hard wired to the chassis. Replace components on the cards in accordance with instructions in Section VII.

4-22. Disassembly of Strobex (Fig. C-5).

WARNING

Dangerous voltages are present in the Strobex which may cause death or injury. Disconnect Strobex from Balancer and discharge capacitors C1201 (22) and C1202 (23) prior to any repair. The flash tube (29) is at several atmospheres pressure and may cause injury if it is broken. Wear safety shield or safety glasses.

CAUTION

Avoid twisting or bending the flash tube as the quartz envelope will break. Avoid touching glass envelope with fingers. Body oils from fingerprints may cause etching of the glass when hot and may result in fracture. Handle flash tubes by metal ends.

a. Remove rear cover (18) by removing six screws (1), six lock washers (2), and six flat-washers (3) and sliding cover out of case (55) to length of electrical leads.

b. Remove circuit card (4) by grasping end and pulling out of connector (5).

c. Remove capacitors C1201 (22) and C1202 (23) by removing two screws (21) and clips (20). Move C1201 and C1202 out of case as far as leads permit. Tag and unsolder leads as necessary.

d. Remove diode package (24) by removing three screws (25). Move diode package out of case as far as leads permit. Tag and unsolder leads as necessary.

e. Remove lens (26) over reflector assembly (43) and flash tube V1201 (29) by removing four nuts (27).

f. Remove four screws (30) and nuts (27) securing reflector (43) to case. Remove reflector and flash tube C1201 (29) out through back.

g. Identify the three leads coming from the handle assembly (49), and tag and unsolder them where they connect to the MODE switch S501 (11) and connector P502 (5).

h. Remove handle assembly (49) by removing four screws (47) and washers (48) attaching handle to case (55).

i. Loosen three screws (50) from nuts (51) to separate handle (49).

4-23. Removal of Flash Tube (Fig.C-5).

WARNING

The flash tube is at several atmospheres pressure and may cause injury if broken. Wear a safety shield or safety glasses. Avoid twisting or bending the flash tube or the quartz glass will fracture.

a. Remove lens cover as indicated below.

b. Remove four nuts (27) attaching lens (26) to case (55).

NOTE

Do not remove red wire and clip from flash tube until flash tube is clear of case.

c. Note position of properly focused old flash tube. From rear, insert blade of large screwdriver in open slot on right side of gold plated tube clamp (41) and twist gently to open clamp. Grasp flash tube C1201 (29) with fingers on metal end of tube and slide straight out of clamp.

d. Remove red lead andd tube clip (28) from end of tube by inserting blade of small screwdriver between clip and metal end of tube. Do not attempt to twist tube free of clip.

4-24. Disassembly of Tester (Fig. C-7).

a. Remove four screws (2) from front panel (47) and rear panel (4), and remove bottom panel (1).

b. Remove four screws (5) and nuts (6), and remove rear panel (4).

c. Remove two screws (9) and remove rotor disc (8)

d. Remove setscrew (11) and remove rotor hub (10).

e. Remove two screws (13) and remove profile cam (12).

f. Remove four screws (15) and nuts (16), and remove doubler (14).

g. Remove four screws (18) and remove two cam followers (17).

h. Remove four metric bolts (20) and remove magnetic pickup bracket (19).

i. Remove eight screws (22) and remove four clamps (21), two accelerometer arms (23), and two springs (24).

j. Remove two short metric screws (26) and two long metric screws (27), and separate Nidec motor (28) from base (25). Do not be alarmed if the two parts of the motor separate. Leave the cable connected to the motor unless it is necessary to replace the motor. If so, tag and unsolder the leads.

k. Remove two short screws (31), two long screws (32), and six nuts (33), and remove connector (30) and circuit card assembly (34 thru 40). Leave wires attached to connector and circuit card unless it is necessary to replace these components. If so, tag and unsolder the leads.

l. Push in on the clamps securing two switches (41) and push switches through front panel. Leave wires attached to switches unless it is necessary to replace them. If so, tag and unsolder leads.

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4-25. Assembly. This section provides instructions to assemble assemblies and subassemblies which have been repaired.

4-26. Assembly of Balancer/Phazor (Fig. C-2).

NOTE

Refer to Balancer schematic diagram(fig. FO-1) and Phazor schematic diagram (Fig. FO-2) for connection of electrical leads.

a. Install R.P.M. TUNE resistor R1201 (21) as follows:

(1) Assemble resistor to bracket (26) with nut and lockwasher provided with resistor.

(2) Turn shaft of R1201 fully counterclockwise.

(3) Set 10-turn dial (27) to 000 and assemble dial to bracket (26) and R1201. Tighten dial to R1201 shaft with two setscrews in dial.

(4) Assemble R1201, bracket (26), and 10-turn dial to Balancer with two screws (23), washers (24), nuts (25), and springs (22).

(5) Solder leads to R1201.

(6) Press knob on dial.

b. Install IPS meter M1201 (17) as follows:

(1) Place meter in position on panel and secure with three screws (18), washers (19), and nuts (20).

(2) Connect red lead to + terminal of meter and black lead to -- terminal.

c. Install rear cover (1) with four screws (2).

4-27. Assembly of Strobex (Fig. C-5).

NOTE

Refer to Strobex schematic diagram (fig. FO-3) for connection of electrical leads.

a. Install handle assembly as follows:

(1) Place S1201 (52) and plate (53) in slot in one-half of handle (49).

(2) Feed cable (46) wires through hole in bottom of handle and feed remaining wires through the top of the handle.

(3) Join the two handle halves with three screws (50) and nuts (51), Ensure that switch and plate is in groove.

(4) Feed wires through hole in bottom of case (55).

(5) Place trigger in position and attach handle to case (55) with four screws (47) and washers (48).

(6) Solder item 4, cable leads to MODE switch S501 (11) and connector P502 (5).

b. Install reflector assembly (43) through rear of case. Attach to case with four screws (30) and nus (27).

CAUTION

Thermal stress will cause lens (26) to break if nuts (27) are tightened against case (55).

c. Install lens (26) with four nuts (27). Tighten nuts and then turn back 1/4 turn.

d. Solder leads to diode package (24) and install in case with three screws (25).

e. Solder leads to capacitors C1201 (23) and C1201 (22) and instaall with two screws (21) and clips (20).

f. Install circuit card C3984 (4) in connector (5) with components side to inside of case.

g. Attach rear cover (18) to case (55) with six screws (1), lockwashers (2), and flatwashers (3).

4-28. Installation of Flash Tube.

a. Remove lens if Nor-Previously Removed (4-23b).

b. Clean reflector (43, fig. C-5) with a clean lint-free cloth dampened with a mild detergent and water solution. Wipe dry with a clean lint-free cloth.

WARNING

The flash tube is at several atmospheres pressure and may cause injury if broken. Wear a safety shield or safety glasses. Avoid twisting or bending the flashg tube or the quartz glass will fracture.

CAUTION

Avoid touching glass envelope of flash tube with fingers. Body oils from fingerprints will cause etching of the glass when hot, resulting in fracture of the glass.

c. Connect high voltage tube clip (28) to small end of replacement flash tube V1201 (29). Hold the clip between the fore and middle fingers and with the thumb, press small metal end of flash tube into clip.

d. Use a screwdriver to spread tube clamp (41). Hold metal end of flash tube with clamp attached and push large end of tube into tube clamp. Slide new tube into clamp the same distance as old tube to facilitate focusing. If lamp has a trigger wire, be sure it is passed between the contact area of the tube clamp.

NOTE

If tube clamp has been spread so that it no longer grabs the tube securely, adjust clamp tension with pliers (without tube in clamp).

e. Use a soft, clean, lint-free cloth to wipe flash tube and reflector clean of fingerprints and dust.

f. Focus flash tube in accordance with paragraph 4-29.

CAUTION

Thermal stress will cause the lens (26) to break if nuts (27) are thightened against case (55).

g. Install lens (26) with four nuts (27). Thighten nuts and then turn back 1/4 turn.

h. Replace rear cover if removed.

4-29. Strobex Focus Adjustment (Fig. 3-8).

a. Remove rear cover (para 4-22a).

b. Connect Strobex to a +28 vdc power source.

c. Squeeze and hold trigger (fig 3-8) and project beam on a dark surface, approximately 3 feet in front of flash tube. Verify that a centered 4-inch diameter spot is seen. Perform the following if, a dark center appears, or if a small bright spot appears in a large light pattern:

(1) Use an insulated screwdriver to turn the three nylon screws (fig 3-8) clockwise until the correct indication is obtained.

(2) Use an insulated screwdriver to turn the three nylon screws (fig 3-8) counterclockwise until the correct indication is obtained.

d. Accomplish final focus by projecting beam on a wall approximately 15 to 20 feet away. Adjust the nylon screws to achieve a spot approximately 1 to 2 feet in diameter. Release trigger.

e. Replace rear cover 4-27g).

4-30. Assembly of Tester (Fig. C-7).

NOTE

Refer to Tester schematic diagram (fig. 4-4) for connection of electrical leads.

a. If necessary, solder wires to two switches (41) and push them through front panel (47) until their clamps snap into place (Fig. C-7).

b. If necessary, solder wires to circuit card assembly (34 through 10) and connector (30). Install connector into front panel and circuit and behind connector. Secure with six nuts (33), two long screws (32), and two short screws (31). Note that two of the nuts are used as spacers between the connector and cidrcuit card.

c. If necessary, solder wires to Nidec motor (28) and mount bottom part of the motor to base (25) with two long metric screws (27) and two short metric screws (26).

d. Assemble two springs (24), two accelerometer arms (23), and four clamps (21) and secure them together with eight screws (22).

e. Install the magnetic pickup bracket (19) onto the top half of the Nidec motor (28) and secure with four metric bolts (20). Mesh the two halves of the motor together.

f. Install the two cam followers (17) onto the accelerometer arms (23) and secure with four screws (18).

g. Install the doubler (14) onto the magnetic pickup bracket (19) and secure with four nuts (16) and screws (15).

h. Apply a light coat of camera oil to cam (12) and assemble profile cam (12) to rotor hub (10) and secure with two screws (13).

i. Install rotor hub (10) and profile cam (12) onto motor shaft and secure with setscrew (11).

j. Install rotor disc (8) onto rotor hub (10) and secure with two screws (9).

k. Install rear panel (4) onto magnetic pickup bracket (19) and secure with four nuts (6) and screws (5).

l. Assemble bottom panel (1) to front panel (47) and rear panel (4) and secure with four screws (2)

4-31. Lubrication. Apply a light coat of camera oil (or equivalent, to the cam (12, fig. C-7) of the Tester during assembly.

4-32. Testing. Perform the diagnostic test procedures after repair and assembly to verify that the equipment is ready to be returned to service. If a new Accelerometer, Accelerometer Cable, Magnetic Pickup, Magnetic Pickup Cable, a DC Cable, or a Signal Simulator is replaced, perform the following tests in TM 55-4920-402-13 & P to verify that the unit is ready for service.

a. Accelerometer Resistance Checks.

b. Accelerometer Cables Resistance Checks.

c. Magnetic Pickup Resistance Checks.

d. Magnetic Pickup Cable Resistance Checks.

e. DC Cables Resistance Checks.

f. Signal Simulator Resistance Checks.

Legend for fig. 4-12:

1. Cover
2. Screw (4)
3. Meter
4. Screw (3)
5. Lockwasher (3)
6. Nut (3)
7. Knob (2)
8. Guard (3)
9. Button (3)

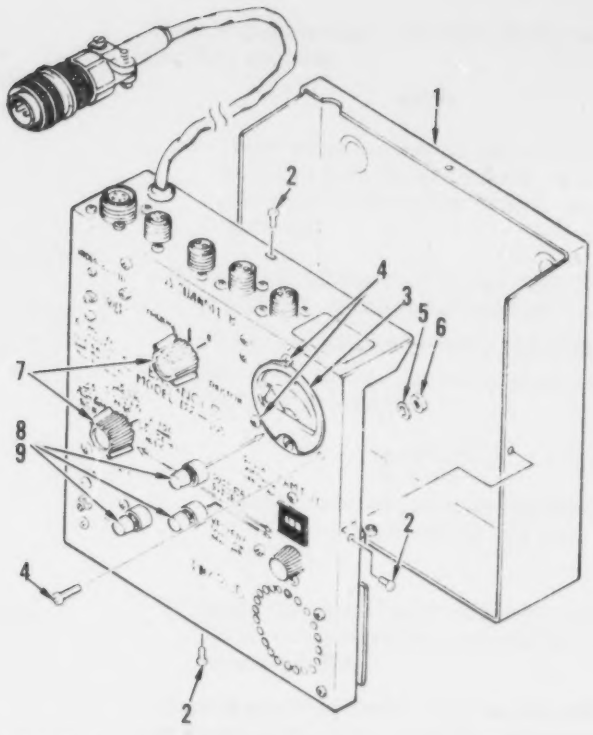


Figure 4-17. Balancer Parts Location

Legend for fig. 4-13:

1. Cover
2. Screw (6)
3. Flatwasher (6)
4. Lockwasher (6)
5. Lens
6. Locknut (4)
7. Clip
8. Flash tube
9. Extrusion
10. Knob
11. Circuit board

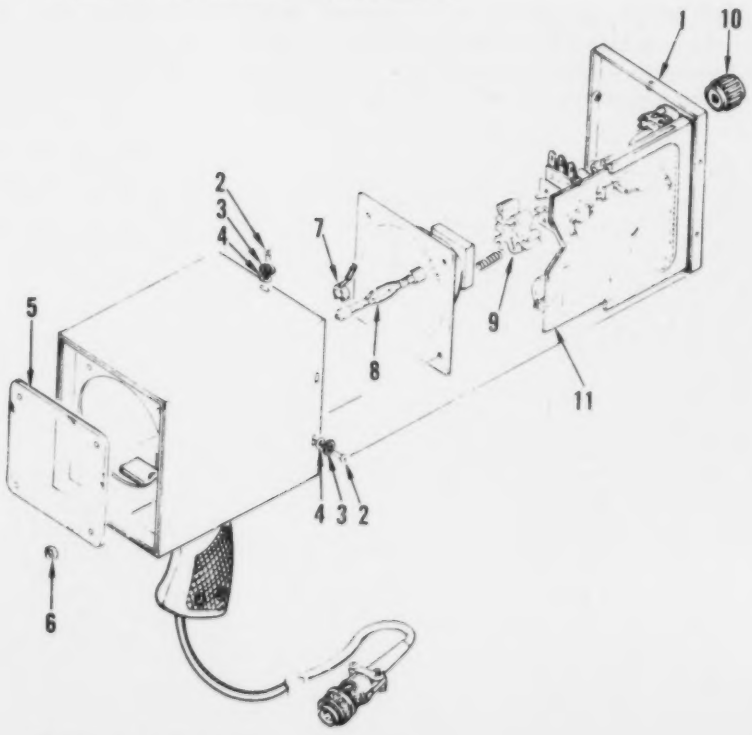


Figure 4-18. Strobex Parts Location

of the new flash tube. Insert blade of screwdriver in open slot on right side of gold plated lamp extrusion (9) and twist gently to open clamp. Grasp flash tube V1201 (8) with fingers on metal end of tube and slide straight out of clamp. Remove tube clip (7) from end of tube by inserting blade of small screwdriver between clip and metal end of tube. Do not attempt to twist tube free of clamp.

4-24. Assembly of Strobex. Install a new flash tube in the Strobex as follows:

a. Clean reflector with a lint-free cloth dampened with a mild detergent and water solution. Wipe dry with a clean lint-free cloth.

CAUTION

Avoid touching glass envelope of flash tube with fingers. Body oils from fingerprints will cause etching of the glass when hot, resulting in fracture of glass.

b. Connect tube clip (7) to small end of replacement flash tube V1201 (8). Hold the clip between the fore and middle fingers and with the thumb, press the small metal end of the flash tube into the clip.

c. With a screwdriver, spread lamp extrusion (9). Hold metal end of tube with clamp attached and push large end of tube into tube clamp. Slide new tube into clamp the same distance as old tube to facilitate focusing. Be sure the trigger wire, on flash tube, is passed between the contact areas of the tube clamp, so that the trigger wire is not pinched between the clamp and tube.

NOTE

If tube clamp has been spread so that it no longer grabs the tube securely, adjust clamp tension with pliers (without tube in clamp).

d. Use a soft lint-free cloth to wipe flash tube and reflector clean of fingerprints and dust.

e. Focus flash tube in accordance with paragraph 3-10 c.

f. Secure rear cover (1) with six screws (2), flatwashers (3), and lockwashers (4).

CAUTION

Thermal stress will cause the clear plastic lens (5) to break if nuts are tightened against it.

g. Install clear plastic lens (5) with four locknuts (6). Tighten until nut contacts lens and then turn back one-quarter turn.

4-25. Disassembly of Tester. Removal and replacement of components is not authorized at this maintenance level.

4-26. Cleaning. Clean the components of the VIBREX whenever inspection indicates it is needed. Clean outside surfaces with a cloth dampened with a solution of mild detergent and water. Wipe dry with a clean cloth.

APPENDIX A
REFERENCES

A-1. Dictionaries of Terms and Abbreviations.

AR 310-25 ..... Dictionary of United States Army Terms

AR 310-50 ..... Authorized Abbreviations and Brevity Codes

A-2. Publication Indexes.

DA PAM 25-30 ..... Consolidated Index of Army Publications and Blank Forms

A-3. Logistics and Storage.

TM 740-90-1 ..... Administrative Storage of Equipment

TM 743-200-1 ..... Storage and Materials Handling

A-4. Maintenance of Supplies and Equipment

AR 750-1 ..... Army Material Maintenance Concepts and Policies

TM 43-0139 ..... Painting Operations Instructions for Field Use

A-5. Other Publications

AR 420-90 ..... Fire Prevention and Protection

AR 55-38 ..... Reporting of Transportation Discrepancies in Shipments

AR 700-58 ..... Packaging Improvement Report

DA PAM 310-13 ..... Military Publications Posting and Filing

DA PAM 738-751 ..... Functional Users' Manual for The Army Maintenance Management System - Aviation (TAMMS-A)

FM-21-11 ..... First Aid for Soldiers

TB 43-180 ..... Calibration Requirements for the Maintenance of Army Materiel

TM 750-244-1-4 ..... Procedures for the Destruction of Aviation Ground Support Equipment (FSC 4920) to Prevent Enemy Use

APPENDIX B
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. Maintenance Allocation Chart.

a. This Maintenance Allocation Chart (MAC) assigns maintenance functions in accordance with the Three Levels of Maintenance concept for army aircraft. These maintenance levels: Aviation Unit Maintenance (AVUM), Aviation Intermediate Maintenance (AVIM) and Depot Maintenance are depicted on the MAC as:

AVUM which corresponds to the O code in the Repair Parts and Special Tools List (RPSTL).

AVIM which corresponds to the F code in the Repair Parts and Special Tools List (RPSTL).

Depot which corresponds to the D code in the Repair Parts and Special Tools List (RPSTL).

b. The maintenance to be performed below depot and in the field is described as follows:

(1) Aviation Unit Maintenance (AVUM). AVUM activities will be staffed and equipped to perform high frequency "On-Equipment" maintenance tasks required to retain or return equipment to a serviceable condition. The maintenance capability of the AVUM will be governed by the MAC and limited by the amount and complexity of support equipment, facilities required, and number of spaces and critical skills available. The range and quantity of authorized spare modules/components will be consistent with the mobility requirements dictated by the air mobility concept. (Assignment of maintenance tasks to divisional company size aviation units will consider the overall maintenance capability of the division, the requirement to conserve personnel and equipment resources and air mobility requirements).

(a) Company Size Aviation Units. Perform those tasks which consist primarily of preventive maintenance and maintenance repair and replacement functions associated with sustaining a high level of equipment operational readiness. Perform maintenance inspections and servicing to include daily, intermediate, periodic and special inspections as authorized by the MAC or higher headquarters. Identify the cause of equipment/system malfunctions using applicable technical manual troubleshooting instructions, Built-In-Test Equipment (BITE), installed instruments, or easy to use Test Measurement and Diagnostic Equipment (TMDE). Replace worn or damaged modules/components which do not require complex adjustments or system alignment and which can be removed/installed with available skills, tools and equipment. Perform operational and continuity checks and make minor repairs. Perform servicing, functional adjustments, and minor repair/replacement. Evacuate unserviceable modules/components and end items beyond the repair capability of AVUM to the supporting AVIM.

(b) Less than Company Size Aviation Units. Aviation elements organic to brigade, group, battalion headquarters and detachment size units are normally small and have less than ten aircraft assigned. Maintenance tasks performed by the aircraft crew chief or assigned aircraft repairman will normally be limited to preventive maintenance inspections, servicing, spot painting, spot drilling, minor adjustments, module/component fault diagnosis and replacement of selected modules/components. Repair functions will normally be accomplished by the supporting AVIM unit.

(2) Aviation Intermediate Maintenance (AVIM). AVIM provides mobile, responsive "One Stop" maintenance support. (Maintenance functions which are not conducive to sustaining air mobility will be assigned to depot maintenance.) Performs all maintenance functions authorized to be done at AVUM. Repair of equipment for return to user will emphasize support or operational readiness requirements. Authorized maintenance includes replacement and repair of modules/components and end items which can be accomplished efficiently with available skills, tools, and equipment. Establishes the Direct Exchange (DX) program for AVUM units by repairing selected items for return to stock when such repairs cannot be accomplished at the AVUM level. Inspects, troubleshoots, tests, diagnoses, repairs, adjusts, calibrates, and aligns system modules/components. Module/component disassembly and repair will support the DX program and will normally be limited to tasks requiring cleaning and the replacement of seals, fittings and items of common hardware. Unserviceable reparable modules/components and end items which are beyond the capability of AVIM to repair will be evacuated to Depot Maintenance. This level will perform special inspections which exceed AVUM capability. Provides quick response maintenance support, on-the-job-training, and technical assistance through the use of mobile maintenance contact teams. Maintenance authorized operational readiness float. Provides collections and classification services for

serviceable/unserviceable material. Operates a cannibalization activity in accordance with AR 750-50. (The aircraft maintenance company within the maintenance battalion of a division will perform AVIM functions consistent with air mobility requirements and conservation of personnel and equipment resources. Additional intermediate maintenance support will be provided by the supporting non-divisional AVIM unit).

B-2. Use of the Maintenance Allocation Chart.

a. The MAC assigns maintenance functions to the lowest level of maintenance based on past experience and the following considerations:

(1) Skills available.

(2) Time required.

(3) Tools and test equipment required and/or available.

b. Only the lowest level of maintenance authorized to perform a maintenance function is indicated. If the lowest level of maintenance cannot perform all tasks of any single maintenance function (e.g., test, repair), then the higher maintenance level(s) that can accomplish additional tasks will also be indicated.

c. A maintenance function assigned to a maintenance level will automatically be authorized to be performed at any higher maintenance level.

d. A maintenance function that cannot be performed at the assigned level of maintenance for any reason may be evacuated to the next higher maintenance organization. Higher maintenance levels will perform the maintenance functions of lower maintenance levels when required or directed by the appropriate commander.

e. The assignment of a maintenance function will not be construed as authorization to carry the associated repair parts in stock. Authority to requisition, stock, or otherwise secure necessary repair parts will be as specified in the repair parts and special tools list appendix.

f. Normally there will be no deviation from the assigned level of maintenance. In cases of operational necessity, maintenance functions assigned to a maintenance level may, on a one-time basis and at the request of the lower maintenance level, be specifically authorized by the maintenance officer of the level of maintenance to which the function is assigned. The special tools, equipment, etc. required by the lower level of maintenance to perform this function will be furnished by the maintenance level to which the function is assigned. This transfer of a maintenance function to a lower maintenance level does not relieve the higher maintenance level of the responsibility of the function. The higher level of maintenance has the authority to determine:

(1) If the lower level is capable of performing the work.

(2) If the lower level will require assistance or technical supervision and on-site inspection.

(3) If the authorization will be granted.

g. Organizational through depot maintenance of the US Army Electronics Command equipment will be performed by designated US Army Electronics Command personnel.

h. Changes to the MAC will be based on continuing evaluation and analysis by responsible technical personnel and on reports received from field activities.

B-3. Definitions.

a. Inspect. To determine serviceability of an item by comparing its physical, mechanical and electrical characteristics with established standards.

b. Test. To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents and air.

d. Adjust. To rectify to the extent necessary to bring into proper operating range.

e. Aline. To adjust specified variable elements of an item to bring to optimum performance.

f. Calibrate. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument or test equipment being compared with the certified standard.

g. Install. To set up for use in an operational environment such as an emplacement, site or vehicle.

h. Replace. To replace unserviceable items with serviceable assemblies, subassemblies or parts.

i. Repair. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.

j. Overhaul. To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards prepared and published for the specific item to be overhauled.

k. Rebuild. To restore an item to a standard as nearly as possible to the original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

B-4. Functional Groups. Standard functional groupings are not considered feasible for aviation ground support equipment due to variation and complexity. Therefore, variations to functional groupings may occur.

B-5. Maintenance Categories and Work Times. The maintenance categories (levels) AVUM, AVIM, and DEPOT are listed on the Maintenance Allocation Chart with individual columns that indicate the work times for maintenance functions at each maintenance level. Work time presentations such as 0.1 indicate the average time it requires a maintenance level to perform a specified maintenance function. If a work time has not been established, the columnar presentation shall indicate "—•—". Maintenance levels higher than the level of maintenance indicated are authorized to perform the indicated function.

B-6. Tools and Test Equipment (Section III). Common tool sets (not individual tools), special tools, test and support equipment required to perform maintenance functions are listed alphabetically with a reference number to permit cross-referencing to column 5 in the MAC. In addition, the maintenance category authorized to use the device is listed along with the item National Stock Number (NSN) and, if applicable, the tool number to aid in identifying the tool/device.

B-7. Remarks (Section IV). Remarks contained in column 6, with an alphabetical code and other columnar notes identified by a number in parentheses, are listed to provide a ready reference to the definition of the remark/note.

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS

BALANCING KIT, VIBREX

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY			(5) TOOLS AND EQUIPMENT	(6) REMARKS
			AVUM	*AVIM	DEPOT		
01	VIBREX Balancing Kit	Inspect	.5				
		Repair			4.0	1	A
		Replace	.5			2	
		Test	.5				B
0101	Cable Assys	Inspect	.5				
		Repair		1.5		1	
		Replace	1.0				
		Test	1.0				B
0103	Magnetic Pickups and Accelerometers	Inspect	.2				
		Replace	.2			1	
		Test	.5			2	B
0105	Brackets/Attachments	Inspect	.5				
		Replace	.3			1	
0107	Signal Simulator	Inspect	.2				
		Replace			.2	1	
		Test			.5		
0201	Balancer/Phazor	Inspect	.5				
		Repair		.5	4.0	1	A
		Replace	.5				
		Test	.5				B
0203	IPS Meter	Inspect		.2			
		Replace		.5		1	A
		Test	.5				B
0301	Balancer Circuit Card Assy	Inspect			.5		
		Repair			2.0	1	
		Replace			1.0	2	
		Test			1.0		B
0401	Phazor Circuit Card Assy	Inspect			.5		
		Repair			2.0	1	
		Replace			1.0	2	
		Test			1.0		
0501	Strobex Tracker Assy	Inspect	.2				
		Repair		.5	2.5	1	A
		Replace	.5			2	B
		Test	.5				

*Area TMDE Support Teams (AT&T)

NOMENCLATURE OF END ITEMS

BALANCING KIT, VIBREX

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY			(5) TOOLS AND EQUIPMENT	(6) REMARKS
			AVUM	* AVIM	DEPOT		
0503	Lamp and Lens	Replace	.2			1	A
0601	Blade Tracker Circuit Assy	Inspect		.5			
		Repair			1.0	1	A
		Replace		.5			
		Test		.5			B
0701	VIBREX Tester Assy	Inspect	.2				
		Repair			2.0	1	A
		Replace	.2			2	
		Test	.5				

*Area TMDE Support Teams (AT&T)

Section III. TOOL AND TEST EQUIPMENT REQUIREMENT

REF. NO.	MAINT. CAT.	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NO.
1	0	Tool Kit, Elec Rpmn	5180-00-323-4915	SC518099CLA06
2	F	Shop Set, AVIM Elec-Instr	4920-00-165-1453	SC492099CLA91ELAM

Section IV. REMARKS

BALANCING KIT, VIBREX

Reference Code	Remarks
A	AVIM Repair limited to replacement of knobs, lamp, lens, plug in circuit card, IPS meter and splicing cables.
B	Operational test on equipment.

APPENDIX C

REPAIR PARTS AND SPECIAL TOOLS LIST

SECTION I. INTRODUCTION

C-1. Scope. **This RPSTL lists and authorizes spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of Aviation Unit and Aviation Intermediate maintenance of the Vibrex Balancing Kit. It authorizes the requisitioning, issue, and disposition of spares, repair parts and special tools as indicated by the source, maintenance and recoverability (SMR) codes.**

C-2. **General.** In addition to Section I, Introduction, this Repair Parts and Special Tools List is divided into the following sections:

a. Section II. Repair Parts List. A list of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Bulk materials are listed in item name sequence. Repair parts kits are listed separately in their own functional group within Section II. Repair parts for repairable special tools are also listed in this section. Items listed are shown on the associated illustration(s) figure(s).

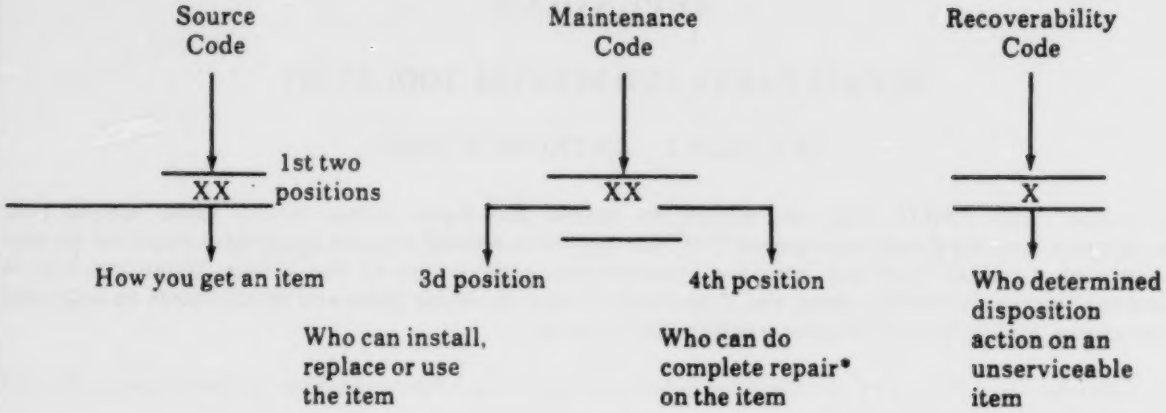
b. Section III. Special Tools List. A list of special tools, special TMDE, and other special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in DESCRIPTION AND USABLE ON CODE column) for the performance of maintenance. (Not applicable)

c. Section IV. National Stock Number and Part Number Index. A list, in National item identification number (NIIN) sequence, of all National stock numbered items appearing in the listing, followed by a list in alphanumeric sequence of all part numbers appearing in the listings. National stock numbers and part numbers are cross-referenced to each illustration figure and item number appearance.

C-3. **Explanation of Columns (Sections II and III).**

a. Item No. (Column (1)). Indicates the number used to identify items called out in the illustration.

b. SMR Code (Column (2)). The Source, Maintenance, and Recoverability (SMR) code is a 5-position code containing supply requisitioning information, maintenance category authorization criteria, and disposition instruction, as shown in the following breakout:



*Complete Repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "Repair" function in a use/user environment in order to restore serviceability to a failed item.

(1) Source Code. The source code tells you how to get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follows:

Code	Explantion
PA PB PC** PD PE PF PG	Stocked items; use the applicable NSN to request/requisition items with these source codes. They are authorized to the category indicated by the code entered in the 3d position of the SMR code. **NOTE: Items coded PC are subject to deterioration.
KD KF KB	Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance category indicated in the 3d position of the SMR code. The complete kit must be requisitioned and applied.

Code	Explanation
MO- (Made at org/AVUM Level) MF- (Made at DS/AVUM Level) MH- (Made at GS Level) ML- (Made at Specialized Repair Act (SRA)) MD- (Made at Depot)	Items with these codes are not to be requested/requisitioned individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the Bulk Material group of the repair parts list in this RPSTL. If the item is authorized to you by the 3d position code of the SMR code, but the source code indicates it is made at a higher level, order the item from the higher level of maintenance.

Code	Explanation
AO - (Assembled by org / AVUM Level) AF - (Assembled by DS / AVIM Level) AH - (Assembled by GS Category) AL - (Assembled by SRA) AD - (Assembled by Depot)	Items with these codes are not to be requested / requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the 3d position code of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.
XA -	Do not requisition an "XA"-coded item. Order its next higher assembly. (Also, refer to the NOTE below.)
XB -	If an "XB" item is not available from salvage, order it using the FSCM and part number given.
XC -	Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.
XD -	Item is not stocked. Order an "XD"-coded item through normal supply channels using the FSCM and part number given, if no NSN is available.

NOTE: Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes, except for those source coded "XA" or those aircraft support items restricted by requirements of AR 700-42.

(2) Maintenance Code. Maintenance codes tells you the level(s) of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the SMR Code as follows:

(a) The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to one of the following levels of maintenance.

Code	Application / Explanation
C	-Crew or operator maintenance done within organizational or aviation unit maintenance.
O	-Organizational or aviation unit category can remove, replace, and use the item.
F	-Direct support or aviation intermediate level can remove, replace, and use the item.
H	-General support level can remove, replace, and use the item.
L	-Specialized repair activity can remove, replace, and use the item.
D	-Depot level can remove, replace, and use the item.

(b) The maintenance code entered in the fourth position tells whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (i.e., perform all authorized repair functions.) (NOTE: Some limited repair may be done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.) This position will contain one of the following maintenance codes.

Code	Application/Explanation
O	-Organizational or (aviation unit) is the lowest level that can do complete repair of the item.
F	-Direct support or aviation intermediate is the lowest level that can do complete repair of the item.
H	-General support is the lowest level that can do complete repair of the item.
L	-Specialized repair activity (designate the specialized repair activity) is the lowest level that can do complete repair of the item.
D	-Depot is the lowest level that can do complete repair of the item.
Z	-Nonreparable. No repair is authorized.
B	-No repair is authorized. (No parts or special tools are authorized for the maintenance of a "B" coded item). However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

(3) Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the SMR Code as follows:

Recoverability Codes	Application/Explanation
Z	-Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in 3d position of SMR Code.
O	-Reparable item. When uneconomically reparable, condemn and dispose of the item at organizational or aviation unit level.
F	-Reparable item. When uneconomically reparable, condemn and dispose of the item at the direct support or aviation intermediate level.
H	-Reparable item. When uneconomically reparable, condemn and dispose of the item at the general support level.
D	-Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item not authorized below depot level.
L	-Reparable item. Condemnation and disposal not authorized below specialized repair activity (SRA).
A	-Item requires special handling or condemnation procedures because of specific reasons (e.g., precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions

c. FSCM (Column (3)). The Federal Supply Code for Manufacturer (FSCM) is a 5-digit numeric code which is used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

d. Part Number (Column (4)). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specification standards, and inspection requirements to identify an item or range of items.

NOTE: When you use a NSN to requisition an item, the item you receive may have a different part number from the part ordered.

e. Description and Usable On Code (UOC) (Column (5)). This column includes the following information:

(1) The Federal item name and, when required, a minimum description to identify the item.

(2) The physical security classification of the item is indicated by the parenthetical entry (insert applicable physical security classification abbreviation, e.g., Phy Sec C1 (C) - Confidential, Phy Sec C1 (S) - Secret, Phy Sec C1 (T) - Top Secret).

(3) Items that are included in kits and sets are listed below the name of the kit or set.

(4) Spare/repair parts that make up an assembled item are listed immediately following the assembled item line entry.

(5) Part numbers for bulk materials are referenced in this column in the line item entry for the item to be manufactured/fabricated.

(6) When the item is not used with all serial numbers of the same model, the effective serial numbers are shown on the last line(s) of the description (before UOC).

(7) The usable on code, when applicable (see paragraph C-5, Special Information).

(8) In the Special Tools List section, the basis of issue (BOI) appears as the last line(s) in the entry for each special tool, special TMDE, and other special support equipment. When density of equipments supported exceeds density spread indicated in the basis of issue, the total authorization is increased proportionately.

(9) The statement "END OF FIGURE" appears just below the last item description in Column 5 for a given figure in both Section II and Section III.

f. QTY (Column (6)). The QTY (quantity per figure column) indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that the quantity is variable and the quantity may vary from application to application.

C-4. Explanation of Columns (Sect. IV).

a. National Stock Number (NSN) Index.

(1) Stock Number Column. This column lists the NSN by National item identification number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN (i.e., 5305-01-674-1467). When using this column to locate an item, ignore the first 4 digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

(2) Fig. Column. This column lists the number of the figure where the item is identified located. The figures are in numerical order in Section II and Section III.

(3) Item Column. The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

b. Part Number Index. Part numbers in this index are listed by part number in ascending alphanumeric sequence (i.e., vertical arrangement of letter and number combination which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

(1) FSCM Column. The Federal Supply Code for Manufacturer (FSCM) is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

(2) Part Number Column. Indicates the primary number used by the manufacturer (individual, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

(3) Stock Number Column. This column lists the NSN for the associated part number and manufacturer identified in the Part Number and FSCM Columns to the left.

(4) FIG. Column. This column lists the number of the figure where the item is identified located in Section II and III.

(5) Item Column. The item number is that number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

C-5. **Special Information.** Use the following subparagraphs as applicable:

a. Usable On Code. The usable on code appears in the lower left corner of the Description column heading. Usable on codes are shown as "UOC: . . ." in the Description Column (justified left) on the first line applicable item description nomenclature. Uncoded items are applicable to all models.

b. Index Numbers. Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the National Stock Number/Part Number Index and the bulk material list in Section II.

c. Associated Publications. Not applicable.

NOTE: Associated publications shall not be listed here in combined narrative and RPSTL manuals.

C-6. **How to Locate Repair Parts.**

a. When National Stock Number or Part Number is Not Known.

(1) First. Using the table of contents, determine the assembly group or subassembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and listings are divided into the same groups.

(2) Second. Find the figure covering the assembly group or subassembly group to which the item belongs.

(3) Third. Identify the item on the figure and note the item number.

(4) Fourth. Refer to the Repair Parts List for the figure to find the part number for the item number noted on the figure.

(5) Fifth. Refer to the Part Number Index to find the NSN, if assigned.

b. When National Stock Number or Part Number is Known:

(1) First. Using the Index of National Stock Numbers and Part Numbers, find the pertinent National Stock Number or Part Number. The NSN index is in National Item Identification Number (NIIN) sequence (see C-4.a(1)). The part numbers in the Part Number index are listed in ascending alphanumeric sequence (see C-4.b.). Both indexes cross-reference you to the illustration figure and item number of the item you are looking for.

(2) Second. After finding the figure and item number, verify that the item is the one you're looking for, then locate the item number in the repair parts list for the figure.

Figure C-1. Vibrex Balancing Kit (Sheet 1 of 3)

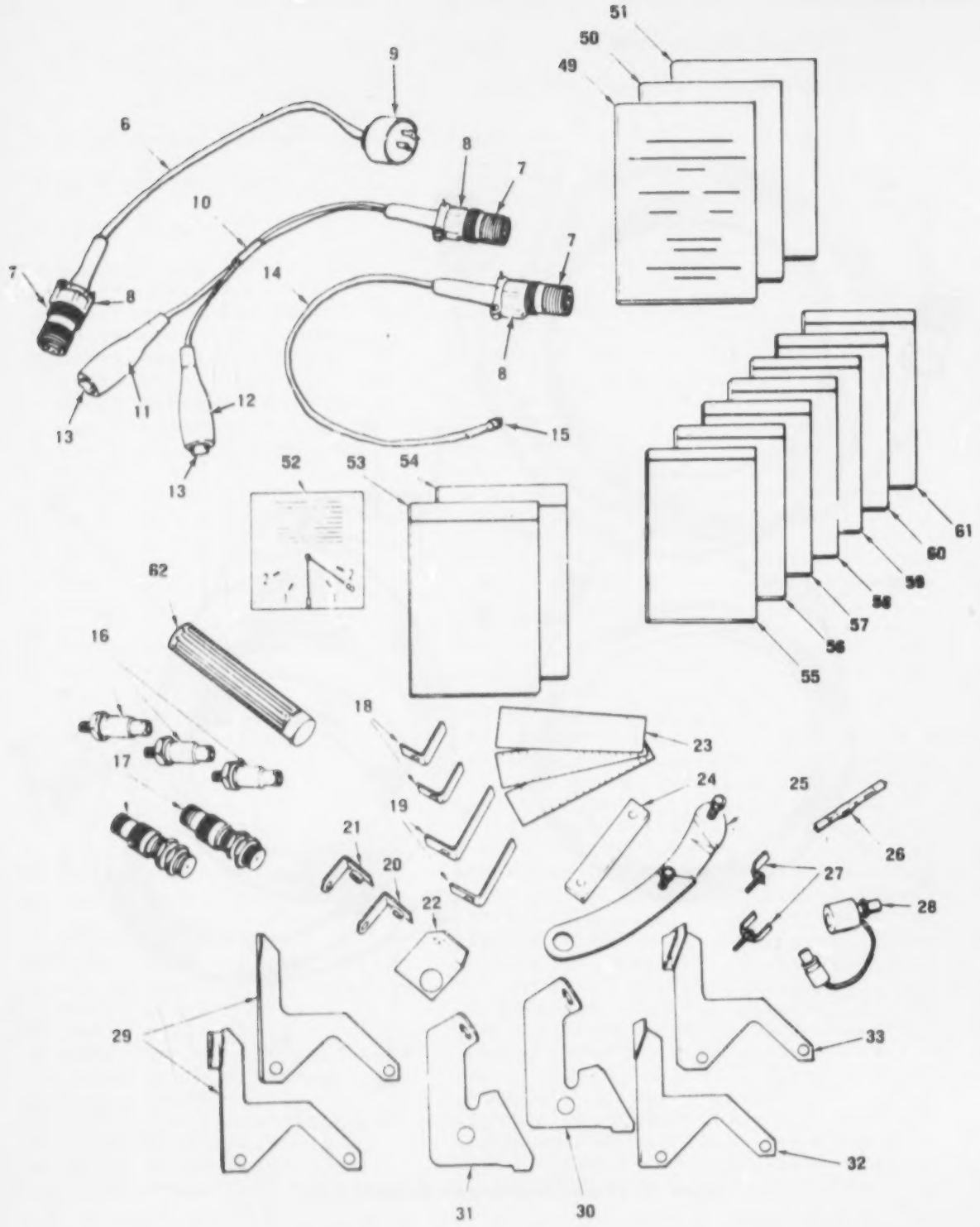


Figure C-1. Vibrex Balancing Kit (Sheet 2 of 3)

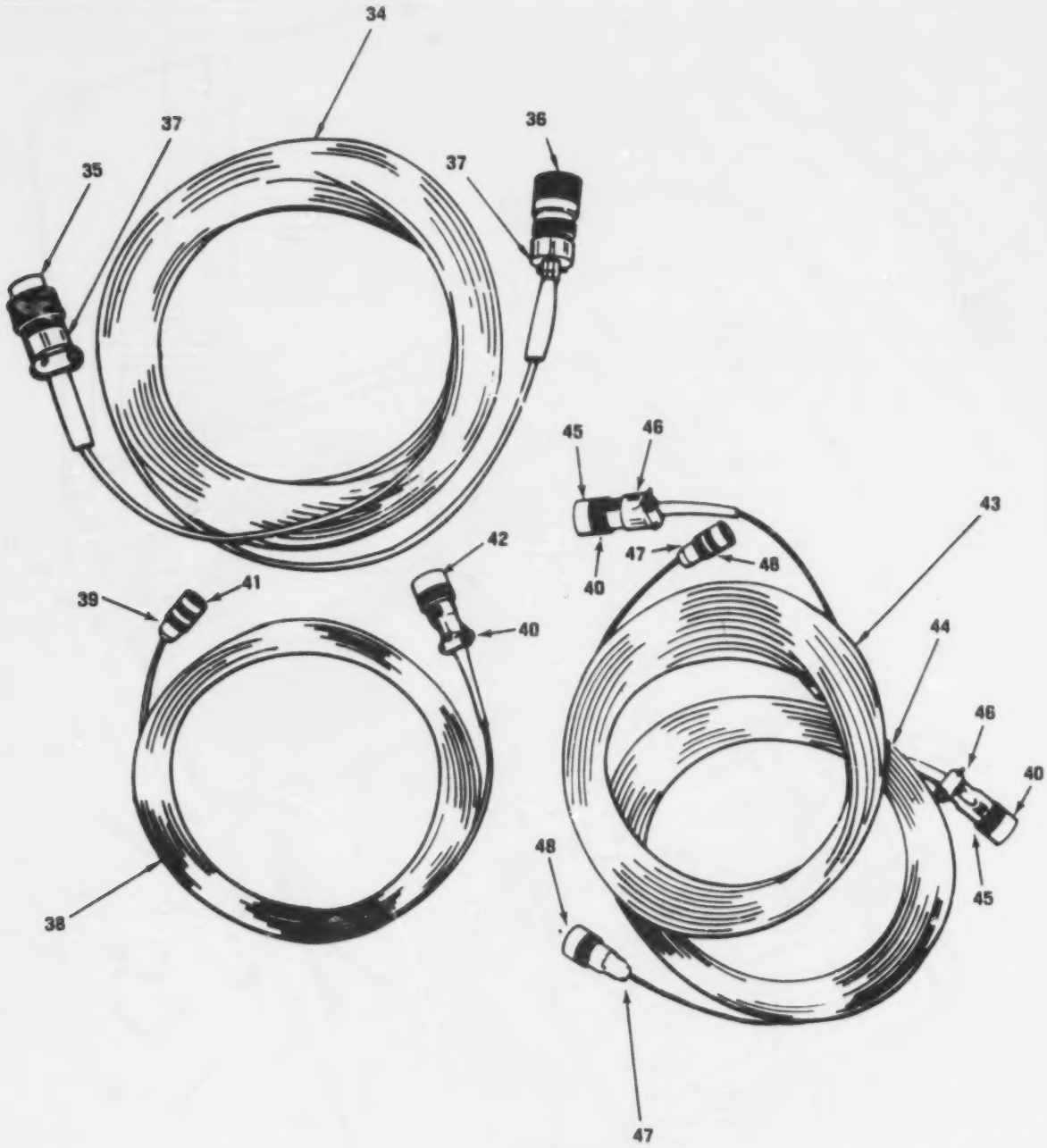


Figure C-1. Vibrex Balancing Kit (Sheet 3 of 3)

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
				GROUP 01. VIBREX BALANCING KIT	
				FIGURE C-1. VIBREX BALANCING KIT	
1	XCOFF	99866	177M6A	BALANCER,PHASER SEE FIGURE C-2 FOR BREAKDOWN.....	REF
2	XCOFD	99866	135M11	TRACKER,BLADE SEE FIGURE C-5 FOR BREAKDOWN.....	1
3	XCOFF	99866	11	STROBOSCOPE SEE FIGURE C-7 FOR BREAKDOWN.....	1
4	PBOFF	99866	47	SCALE,BEAM INDICATI.....	1
5	XDOZZ	99866	348	CASE,CARRYING,VIBRE.....	1
6	PBOZZ	99866	8314[illegible]-1	CABLE,ADAPTER,VIBRE.....	1
7	PBOZZ	96906	MS21 2R16-11S	.CONNECTOR,RECEPTACL.....	1
8	PBOZZ	96906	MS3057-8A	.CLAMP,CABLE,ELECTRI.....	3
9	PBOZZ	99850	5450	.CONNECTOR,PLUG,ELEC.....	1
10	PBOZZ	99866	8314[illegible]-5	CABLE,ADAPTER,VIBRE.....	1
11	XAOZZ	83330	711BLACK	.INSULATOR,BLACK.....	1
12	XAOZZ	83333	711RED	.INSULATOR,RED.....	1
13	XAOZZ	76545	400	.CLIP,ELECTRICAL.....	2
14	PBOZZ	99866	8314[illegible]-3	CABLE,ADAPTER,VIBRE.....	1
15	PBOZZ	96906	MS25231-313	.LAMP,INCANDESCENT.....	1
16	PBOZZ	99866	41779	ACCELEROMETER,MECHA.....	3
17	PBOZZ	99866	3030AN	PICKUP,MAGNETIC,VIB.....	2
18	PBOZZ	99866	A3428-2	TARGET SET,VIBREX.....	1
19	PBOZZ	99866	A3287	TARGET SET,VIBREX.....	1
20	PBOZZ	99866	A3382	BRACKET,ACCELEROMET.....	1
21	PBOZZ	99866	A3383	BRACKET,ACCELEROMET.....	1
22	PBOZZ	99866	A3104	BRACKET,MAGNETIC,VI.....	1
23	PBOZZ	99866	A331[illegible]	TAPE,REFLECTIVE.....	1
24	PBOZZ	99866	2159	BRACKET,MAGNETIC,VI.....	1
25	XAOZZ	99866	A3160	.BAR,BACKUP.....	1
26	PBOZZ	99866	355	LAMP,SPECIAL.....	1
27	PBOZZ	99866	B3381	INTERRUPTER SET,VIB.....	1
28	PBOZZ	99866	B4225	SIMULATOR,SIGNAL.....	1
29	PBOZZ	99866	83251	INTERRUPTER SET,VIB.....	1
30	PBOZZ	99866	C4559	BRACKET,MAGNETIC,VI.....	1
31	PBOZZ	99866	C4758	BRACKET,MAGNETIC,VI.....	1
32	PBOZZ	99866	83103-1	INTERRUPTER.....	1
33	PBOZZ	99866	83103-2	INTERRUPTER.....	1
34	PBOZZ	99866	A3529	CABLE,EXTENSION.....	1
35	PBOZZ	96906	MS3106A16-11P	.CONNECTOR,PLUG,ELEC.....	1
36	PBOZZ	96906	MS3106A16-11SC	.CONNECTOR,PLUG,ELEC.....	1
37	PBOZZ	96906	MS3057-8A	.CLAMP,CABLE,ELECTRI.....	2
38	PBOZZ	99866	A3319-2	CABLE ASSEMBLY,SPEC.....	2
39	PBOZZ	96906	MS3456W10SL-4P	.CONNECTOR,PLUG,ELEC.....	1
40	XDOZZ	96906	MS3057-4A	.CLAMP,CABLE,ELECTRI.....	1
41	XDOZZ	99866	A4269	.RINGLOCK.....	1
42	PBOZZ	96906	MS3106A10SL4S	.CONNECTOR,PLUG,ELEC.....	1
43	PBOZZ	99866	A4296-1	CABLE ASSEMBLY,SPEC.....	1
44	PBOZZ	99866	A4296-2	CABLE ASSEMBLY,SPEC.....	2
45	PBOZZ	71468	CA31 6A-10SL-3P	.CONNECTOR,PLUG.....	2

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)
46	PBOZZ	00613	10SL	.CLAMP,CABLE.....
47	PBOZZ	77820	PT06P8-3S	.CONNECTOR,PLUG.....
48	XAOZZ	77820	10-150-913-8	.SHELL,POTTING.....
49	PBOZZ	99866	4280	MANUAL,TECHNICAL.....
49	PBOZZ	99866	4290	MANUAL,TECHNICAL.....
51	PBOZZ	99866	4300	MANUAL,TECHNICAL.....
52	PBOZZ	99866	3597	CHART,CORRECTOR.....
53	PBOZZ	99866	3411	SHEET,TECHNICAL.....
54	PBOZZ	99866	3413	CHART,BALANCE.....
55	PBOZZ	99866	3438	SHEET,TECHNICAL.....
57	PBOZZ	99866	3875	SHEET,TECHNICAL.....
58	PBOZZ	99866	4020	SHEET,TECHNICAL.....
59	PBOZZ	99866	4262	CHART.....
60	PBOZZ	99866	4273	SHEET,TECHNICAL.....
61	PBOZZ	99866	4173	SHEET,TECHNICAL.....
62	PAOZZ	96906	MS3367-5	STRAP,TIEDOWN,ELECT.....

END OF FIGURE

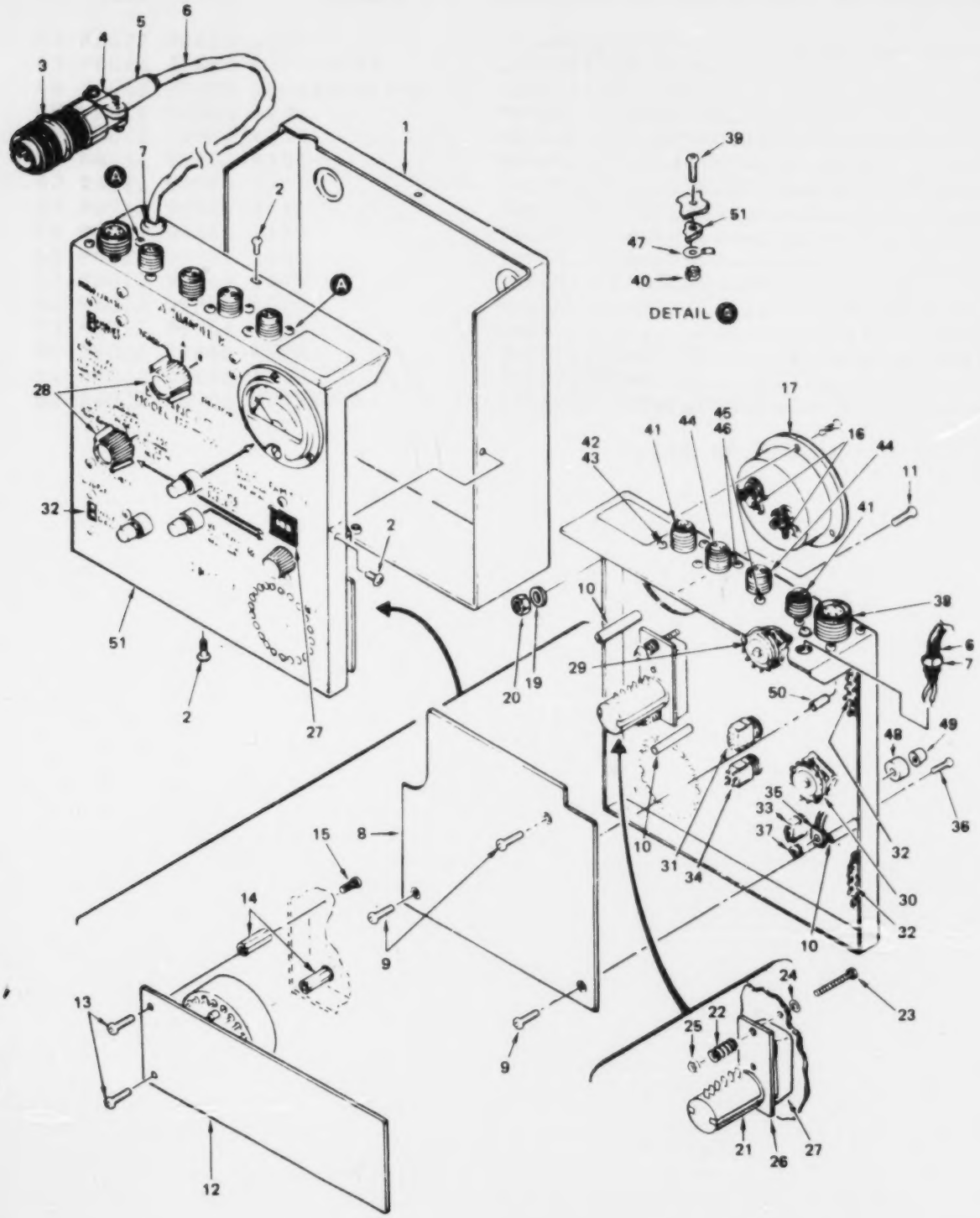


Figure C-2. Balancer/Phazor

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
				GROUP 02. BALANCING/PHASOR	
				FIGURE C-2. BALANCER/PHASOR	
	PBOFF	99866	177M6A	BALANCER,PHASER.....	1
1	PBFZZ	99866	C4125	.COVER,ACCESS.....	1
2	PAOZZ	96906	MS51957-13B	.SCREW,MACHINE.....	4
	PBOZZ	99866	A4185	.CABLE ASSEMBLY,POWE.....	1
3	PBOZZ	96906	MS3106A16-11P	..CONNECTOR,PLUG,ELEC.....	1
4	XDOZZ	81349	M85049/41-8W	..CLAMP,CABLE,ELECTRI.....	1
5	PBOZZ	02660	9779-513-6	..BUSHING,RUBBER.....	1
6	PBFZZ	99866	A4335	..CABLE,SPECIAL PURPO.....	10
7	PBFZZ	28520	6P-4	.SUPPORT,SPECIAL,VIB.....	1
8	XCFFF	99866	C4146	.CIRCUIT CARD ASSEMB SEE FIGURE C-3 FOR BREAKDOWN.....	1
9	PAFZZ	96906	MS51957-28	.SCREW,MACHINE.....	4
10	PBFZZ	99866	A4381-1	.STANDOFF.....	4
11	PAFZZ	96906	MS51957-28B	.SCREW,MACHINE.....	4
12	XCFFD	99866	B4193	.CIRCUIT CARD ASSEMB SEE FIGURE C-4 FOR BREAKDOWN.....	1
13	PAFZZ	96906	MS51957-28	.SCREW,MACHINE.....	2
14	PBFZZ	83330	8445	.POST,ELECTRICAL-MEC.....	2
15	PAFZZ	96906	MS51957-28B	.SCREW,MACHINE.....	2
16	PBFZZ	83330	1410-14	.TERMINAL,LUG.....	2
17	PBFFF	99866	A3307	.METER,SPECIAL SCALE.....	1
19	PAFZZ	96906	MS35338-135	.WASHER,LOCK.....	3
20	PAFZZ	96906	MS35649-244	.NUT,PLAIN,HEXAGON.....	3
21	PBFZZ	02111	534-202/202	.RESISTOR,VARIABLE,W.....	1
22	PBFZZ	99866	A2047	.SPRING,HELICAL,C.....	2
23	PAFZZ	96906	MS51957-36B	.SCREW,MACHINE.....	2
24	PAFZZ	96906	MS35333-71	.WASHER,LOCK.....	2
25	PAFZZ	96906	MS21042-06	.NUT,SELF-LOCKING,EX.....	2
26	PBFZZ	99866	A4338	.BRACKET,MOUNTING.....	1
27	PBFZZ	02111	18-1-31	.DIAL,DIGITAL,VIBREX.....	1
28	PBOZZ	32767	B506	.KNOB.....	2
29	PBFZZ	71590	PSA-214	.SWITCH,ROTARY.....	1
30	PBOZZ	76854	399260-AM	.SWITCH,ROTARY.....	1
31	PBFZZ	09353	8125W	.SWITCH,PUSH.....	1
32	PBFZZ	91929	1RA4	.SWITCH,SENSITIVE.....	2
33	PBFZZ	09353	8125Z	.SWITCH,PUSH.....	1
34	PBFZZ	09353	8225Z	.SWITCH,PUSH..... BOI:1 PER END ITEMS	1
35	PBFZZ	80131	2N4918	.TRANSISTOR.....	1
36	PAFZZ	96906	MS51957-15B	.SCREW,MACHINE.....	1
37	PAFZZ	78189	511-041800-00	.NUT,PLAIN,ASSEMBLED.....	1
38	PBFZZ	96906	MS3102R14S5S	.CONNECTOR,RECEPTACL.....	1
39	PAOZZ	96906	MS51957-15B	.SCREW,MACHINE.....	4
40	PAFZZ	78189	511-041800-00	.NUT,PLAIN,ASSEMBLED.....	4
41	PBFZZ	96906	MS3102R10SL3S	.CONNECTOR,RECEPTACL.....	2
42	PAOZZ	96906	MS51957-15B	.SCREW,MACHINE.....	4
43	PAFZZ	78189	511-041800-00	.NUT,PLAIN,ASSEMBLED.....	4
44	PBFZZ	96906	MS3102E10SL4S	.CONNECTOR,RECEPTACL.....	2

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
45	PAFZZ	96906	MS51957-15B	.SCREW,MACHINE.....	4
46	PAOZZ	78189	511-041800-00	.NUT,PLAIN,ASSEMBLED.....	4
47	PBFZZ	96906	MS77068-1	.TERMINAL,LUG.....	2
48	PBFZZ	95146	G12B	.GUARD,SWITCH.....	2
49	PBFZZ	09353	7527-2	.PUSH BUTTON.....	2
50	PBFZZ	81349	JAN1N3613	.SEMICONDUCTOR DEVIC.....	1
51	PBFZZ	99866	C4124	.PANEL,FRONT,VIBREX.....	1
	PBFZZ	13103	43-77-7	.INSULATOR,PLATE MICA.....	1

END OF FIGURE

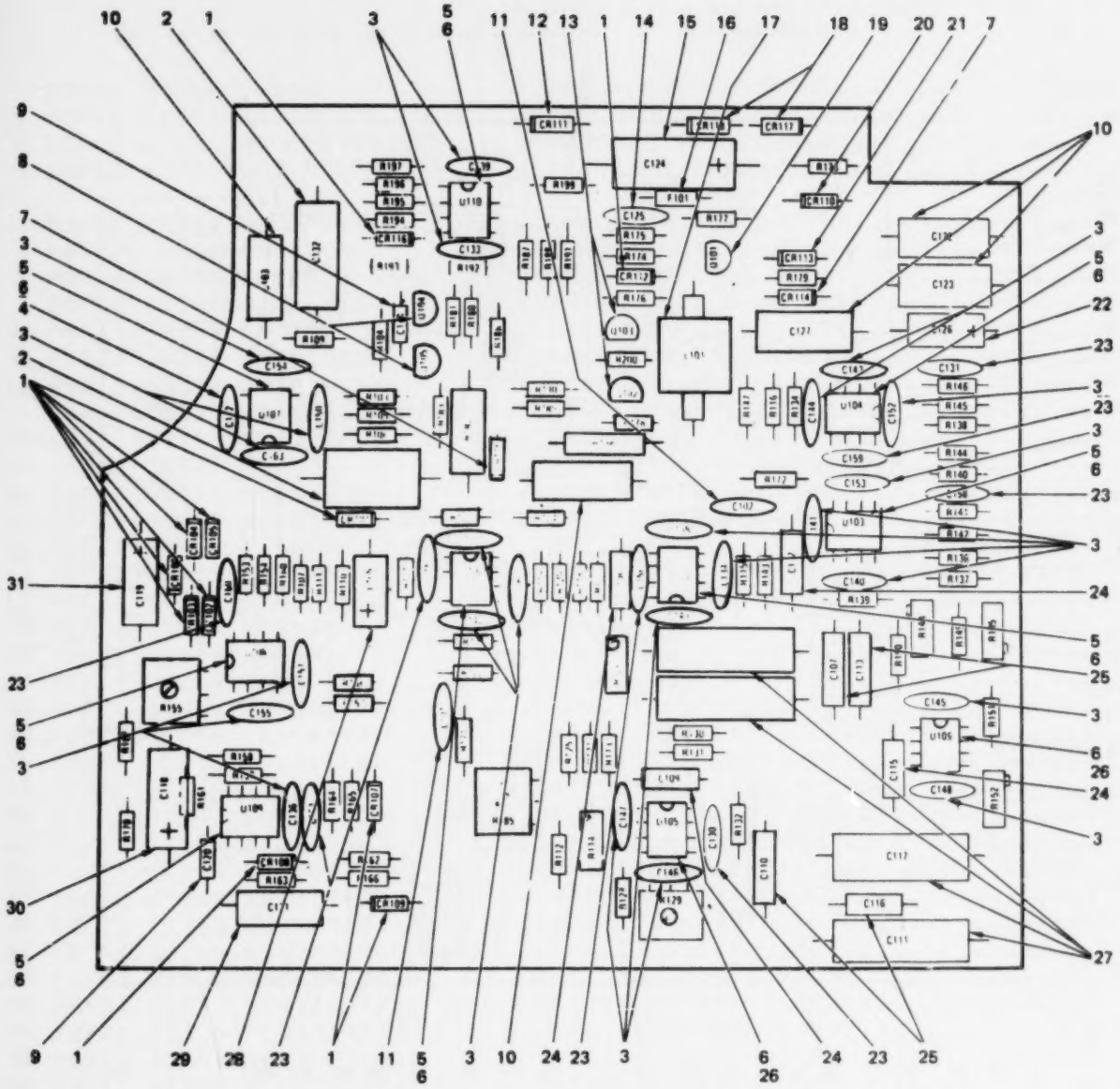


Figure C-3. Balancer Circuit Card Assembly (Sheet 1 of 2)

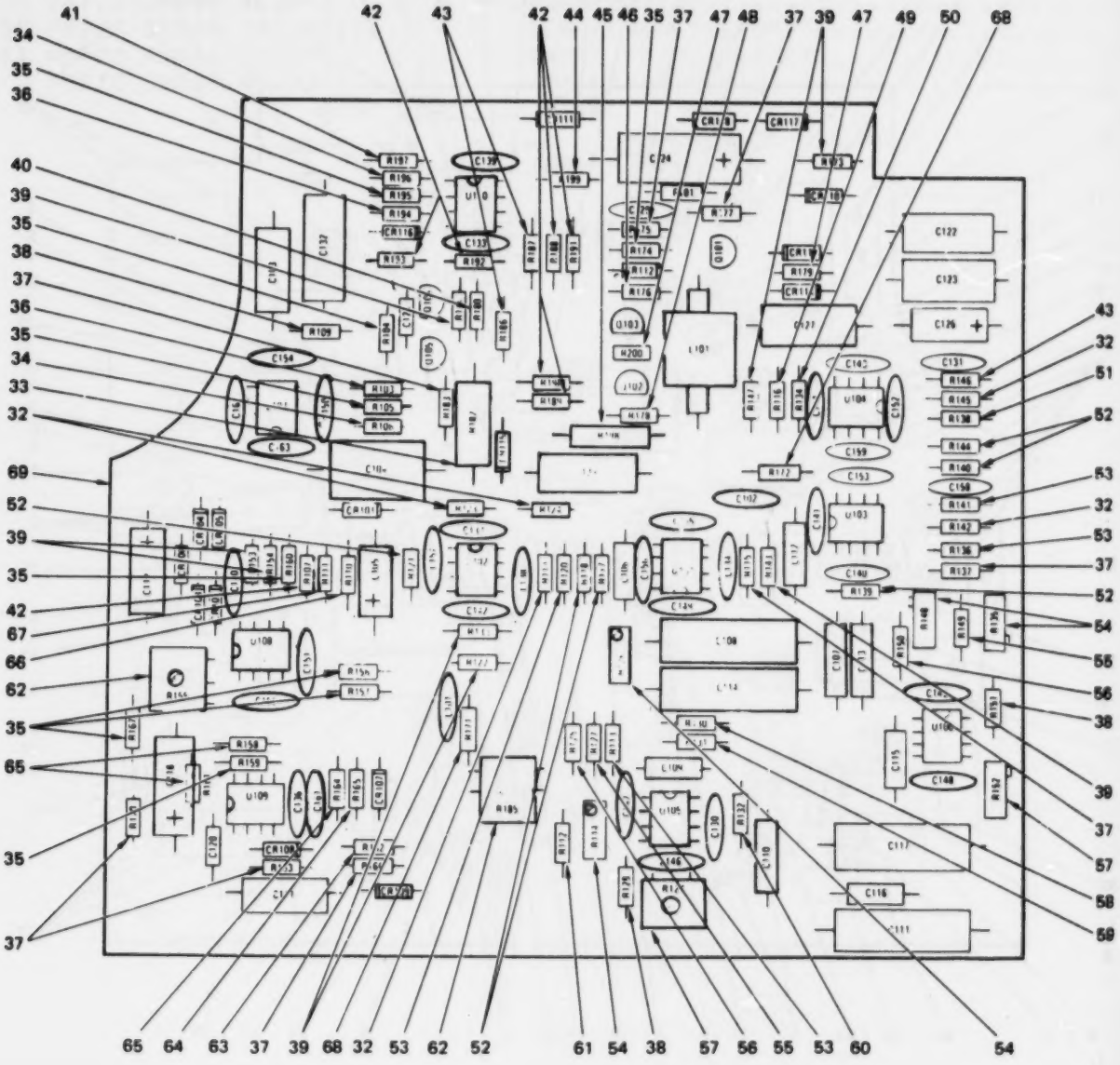


Figure C-3. Balancer Circuit Card Assembly (Sheet 2 of 2)

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
				GROUP 03. BALANCER CIRCUIT CARD ASSY	
				FIGURE C-3. BALANCER CIRCUIT CARD ASSEMBLY	
	PBFFF	99866	C4146	CIRCUIT CARD ASSEMB.....	1
1	PBFZZ	81349	JAN1N483B	.SEMICONDUCTOR DEVIC.....	11
2	XDFZZ	14752	230B1B105J	.CAPACITOR,FIXED,MET.....	2
3	PBFZZ	60705	563CY5SBA250EC103Z	.CAPACITOR,FIXED,CER.....	24
4	PBFZZ	81349	CK60AX471K	.CAPACITOR,FIXED,CER.....	1
5	PBFZZ	26916	058-001691	.MICROCIRCUIT,LINEAR.....	8
6	PBFZZ	06776	ICN-083-S3-G	.SOCKET,CIRCUIT BOAR.....	10
7	PBFZZ	81349	JAN1N4464	.SEMICONDUCTOR DEVIC.....	2
8	PBFZZ	04713	2N3906	.TRANSISTOR.....	2
9	PBFZZ	56289	292P10252	.CAPACITOR,FIXED,PLA.....	2
10	PBFZZ	56289	292P10452	.CAPACITOR,FIXED,PLA.....	5
11	PBFZZ	81349	M39014/02-1350	.CAPACITOR,FIXED,CER.....	2
12	PBFZZ	04713	1N4753A	.SEMICONDUCTOR DEVIC.....	1
13	PBFZZ	04713	2N3904	.TRANSISTOR.....	2
14	PBFZZ	56289	5GAS10	.CAPACITOR,FIXED,CER.....	1
15	PBFZZ	56289	30D256G050CC2	.CAPACITOR,FIXED,ELE.....	1
16	PBFZZ	75915	275001	.FUSE,CARTRIDGE.....	1
17	PBFZZ	76493	4668	.COIL,RADIO FREQUENC.....	1
18	PBFZZ	81349	JAN1N4460	.SEMICONDUCTOR DEVIC.....	2
19	PBFZZ	04713	MPSA56	.TRANSISTOR.....	1
20	PBFZZ	81349	JAN1N3613	.SEMICONDUCTOR DEVIC.....	1
21	PBFZZ	01295	1N459A	.SEMICONDUCTOR DEVIC.....	1
22	PBFZZ	81349	M39003/01-3088	.CAPACITOR,FIXED,ELE.....	1
23	PBFZZ	81349	CK60BX101K	.CAPACITOR,FIXED,CER.....	8
24	PBFZZ	27556	BA2A602F	.CAPACITOR,FIXED,MET.....	4
25	PBFZZ	27556	BA2A543F	.CAPACITOR,FIXED,MET.....	4
26	PBFZZ	81349	M38510/10101BPC	.MICROCIRCUIT,LINEAR.....	2
27	PBFZZ	27556	BA2A593F	.CAPACITOR,FIXED,MET.....	4
28	PBFZZ	81349	M39003/01-3006	.CAPACITOR,FIXED,ELE.....	1
29	PBFZZ	27556	XV2C274J	.CAPACITOR,FIXED,MET.....	1
30	PBFZZ	81349	M39003/01-2993	.CAPACITOR,FIXED,ELE.....	1
31	PBFZZ	81349	M39003/01-2966	.CAPACITOR,FIXED,ELE.....	1
32	PBFZZ	81349	RNC60K1002FS	.RESISTOR,FIXED,FILM.....	5
33	PBFZZ	81349	RCR32G391JS	.RESISTOR,FIXED,COMP.....	1
34	PBFZZ	81349	RCR07G332JS	.RESISTOR,FIXED,COMP.....	2
35	PBFZZ	81349	RCR07G104JS	.RESISTOR,FIXED,COMP.....	9
36	PBFZZ	81349	RCR07G222JS	.RESISTOR,FIXED,COMP.....	2
37	PBFZZ	81349	RCR07G103JS	.RESISTOR,FIXED,COMP.....	8
38	PBFZZ	81349	RCR07G223JS	.RESISTOR,FIXED,COMP.....	3
39	PBFZZ	81349	RCR07G102JS	.RESISTOR,FIXED,COMP.....	8
40	PBFZZ	81349	RCR07G150JS	.RESISTOR,FIXED,COMP.....	1
41	PBFZZ	81349	RCR07G473JS	.RESISTOR,FIXED,COMP.....	1
42	PBFZZ	81349	RNC60K1003FS	.RESISTOR,FIXED,FILM.....	7
43	PBFZZ	81349	RNC60K4992FS	.RESISTOR,FIXED,FILM.....	3
44	PBFZZ	81349	RCR07G822JS	.RESISTOR,FIXED,COMP.....	1

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)
45	PBFZZ	81349	RCR20G2R7JS	.RESISTOR,FIXED,COMP.....
46	PBFZZ	81349	RCR07G152JS	.RESISTOR,FIXED,COMP.....
47	PBFZZ	81349	RCR07G101JS	.RESISTOR,FIXED,COMP.....
48	PBFZZ	81349	RCR07G100JS	.RESISTOR,FIXED,COMP.....
49	PBFZZ	81349	RNC60K2003FS	.RESISTOR,FIXED,FILM.....
50	PBFZZ	81349	RNC60K3012FS	.RESISTOR,FIXED,FILM.....
51	PBFZZ	81349	RNC60K1004FS	.RESISTOR,FIXED,FILM.....
52	PBFZZ	81349	RNC60K2001FS	.RESISTOR,FIXED,FILM.....
53	PBFZZ	81349	RNC60K1102FS	.RESISTOR,FIXED,FILM.....
54	PBFZZ	73138	72RXW2K	.RESISTOR,VARIABLE,N.....
55	PBFZZ	81349	RNC60K1912FS	.RESISTOR,FIXED,FILM.....
56	PBFZZ	81349	RNC60K2002FS	.RESISTOR,FIXED,FILM.....
57	PBFZZ	73138	72RXW10K	.RESISTOR,VARIABLE,N.....
58	PBFZZ	81349	RNC60K2492FS	.RESISTOR,FIXED,FILM.....
59	PBFZZ	81349	RNC60K2493FS	.RESISTOR,FIXED,FILM.....
60	PBFZZ	81349	RNC60K2494FS	.RESISTOR,FIXED,FILM.....
61	PBFZZ	81349	RNC60K6043FS	.RESISTOR,FIXED,FILM.....
62	PBFZZ	73138	72RXW50K	.RESISTOR,VARIABLE,N.....
63	PBFZZ	81349	RCR07G333JS	.RESISTOR,FIXED,COMP.....
64	PBFZZ	81349	RCR07G823JS	.RESISTOR,FIXED,COMP.....
65	PBFZZ	81349	RCR07G105JS	.RESISTOR,FIXED,COMP.....
66	PBFZZ	81349	RNC60K4991FS	.RESISTOR,FIXED,FILM.....
67	PBFZZ	81349	RNC60K4532FS	.RESISTOR,FIXED,FILM.....
68	PBFZZ	81349	RCR07G221JS	.RESISTOR,FIXED,COMP.....
69	XAFZZ	99866	AW4133	.CIRCUIT BOARD,VIBRE.....

END OF FIGURE

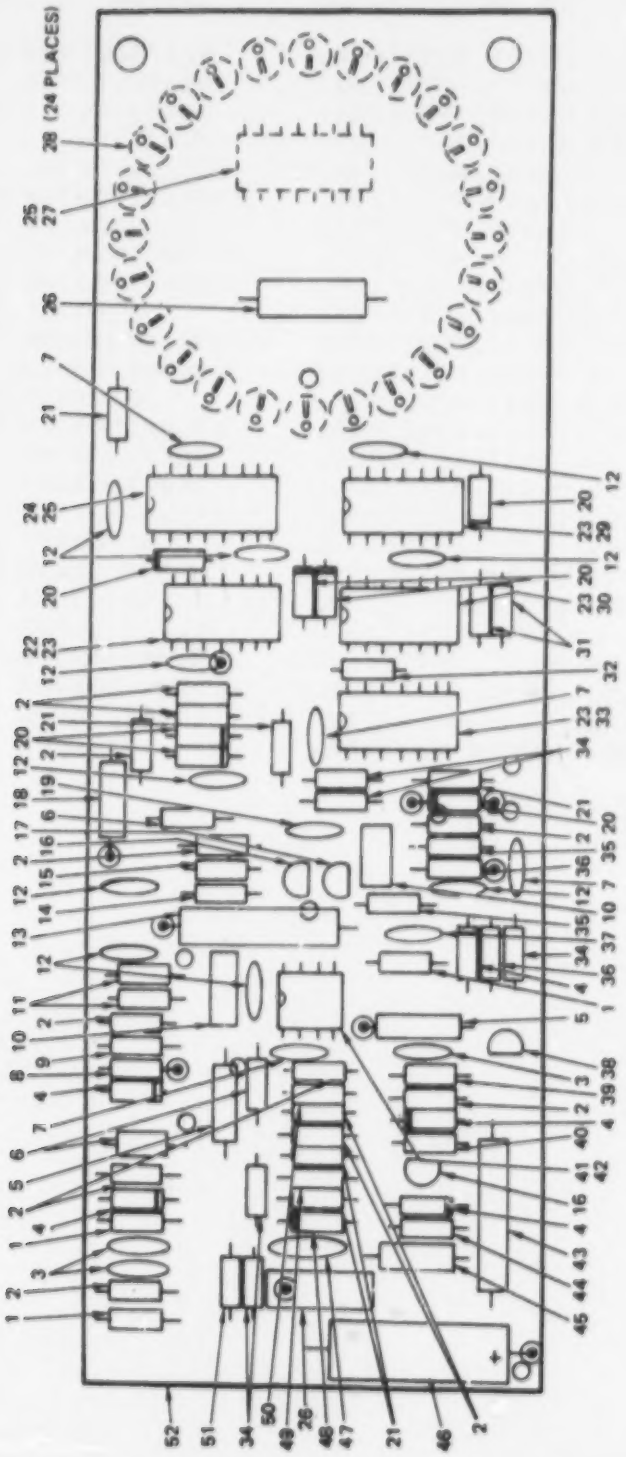


Figure C-4. Phaser Circuit Card Assembly

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
				GROUP 04. PHAZOR CIRCUIT CARD ASSEMBLY	
				FIGURE C-4. PHAZOR CIRCUIT CARD ASSEMBLY	
	PBFFD	99866	84193	CIRCUIT CARD ASSEMB.....	1
1	PBFZZ	81349	RCR07G473JS	.RESISTOR,FIXED,COMP.....	3
2	PBFZZ	81349	RCR07G103JS	.RESISTOR,FIXED,COMP.....	12
3	PBFZZ	81349	CK60AW102M	.CAPACITOR,FIXED,CER.....	3
4	PBFZZ	81349	JAN1N914	.SEMICONDUCTOR DEVIC.....	5
5	PBFZZ	56289	192P10352	.CAPACITOR,FIXED,PLA.....	2
6	PBFZZ	14752	230B1F472J	.CAPACITOR,FIXED,MET.....	3
7	PBFZZ	81349	CK60BX101K	.CAPACITOR,FIXED,CER.....	4
8	PBFZZ	81349	RCR07G475JS	.RESISTOR,FIXED,COMP.....	1
9	PBFZZ	56289	292P10252	.CAPACITOR,FIXED,PLA.....	1
10	PBFZZ	78138	72RXW20K	.SOLENOID,ELECTRICAL.....	2
11	PBFZZ	81349	RNC60K2003FS	.RESISTOR,FIXED,FILM.....	2
12	PBFZZ	60705	563CY5S8A250EC103Z	.CAPACITOR,FIXED,CER.....	10
13	PBFZZ	05079	HV3.9-450C4LP1	.CAPACITOR,FIXED,ELE.....	1
14	PBFZZ	81349	RNC60K4022FS	.RESISTOR,FIXED,FILM.....	1
15	PBFZZ	81349	RCR07G822JS	.RESISTOR,FIXED,COMP.....	1
16	PBFZZ	04713	2N3906	.TRANSISTOR.....	2
17	PBFZZ	04713	2N4871	.TRANSISTOR.....	1
18	PBFZZ	14752	230B1C473J	.CAPACITOR,FIXED,MET.....	1
19	PBFZZ	60705	C0168102E271K	.CAPACITOR,FIXED,CER.....	1
20	PBFZZ	81349	JAN1N270	.SEMICONDUCTOR DEVIC.....	7
21	PBFZZ	81349	RCR07G472JS	.RESISTOR,FIXED,COMP.....	5
22	PBFZZ	04713	MC939L	.MICROCIRCUIT,DIGITA.....	1
23	PBOZZ	06776	ICN-143-S3-G	.SOCKET,PLUG-IN ELEC.....	4
24	PBFZZ	81349	M38510/01501BEB	.MICROCIRCUIT,DIGITA.....	1
25	PBOZZ	06776	ICN-163-S3-G	.SOCKET,PLUG-IN ELEC.....	2
26	PBFZZ	56289	225P10494XD3	.CAPACITOR,FIXED,PLA.....	2
27	PBFZZ	81349	M38510/01005BEB	.MICROCIRCUIT,DIGITA.....	1
28	PBFZZ	04423	41-0118-01	.LIGHT EMITTING DIOD.....	24
29	PBFZZ	81349	M38510/00202BCB	.MICROCIRCUIT,DIGITA.....	1
30	PBFZZ	81349	M38510/00303BCB	.MICROCIRCUIT,DIGITA.....	1
31	PBFZZ	81349	RCR07G681JS	.RESISTOR,FIXED,COMP.....	2
32	PBFZZ	81349	RCR07G680JS	.RESISTOR,FIXED,COMP.....	1
33	PBFZZ	81349	M38510/10802BCB	.MICROCIRCUIT,LINEAR.....	1
34	PBFZZ	81349	RCR07G102JS	.RESISTOR,FIXED,COMP.....	5
35	PBFZZ	81349	RCR07G221JS	.RESISTOR,FIXED,COMP.....	2
36	PBFZZ	81349	RCR07G104JS	.RESISTOR,FIXED,COMP.....	2
37	PBFZZ	14655	CD15FD501G03	.CAPACITOR,FIXED,MIC.....	1
38	PBFZZ	04713	2N3904	.TRANSISTOR.....	1
39	PBFZZ	81349	RCR07G562JS	.RESISTOR,FIXED,COMP.....	1
40	PBFZZ	81349	RCR07G392JS	.RESISTOR,FIXED,COMP.....	1
41	PBFZZ	26916	058-001691	.MICROCIRCUIT,LINEAR.....	1
42	PBOZZ	06776	ICN-083-S3-G	.SOCKET,PLUG-IN ELEC.....	1
43	PBFZZ	44655	4569	.RESISTOR,FIXED,WIRE.....	1
44	PBFZZ	81349	RCR07G390JS	.RESISTOR,FIXED,COMP.....	1

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)
45	PBFZZ	81349	RCR20G122JS	.RESISTOR,FIXED,COMP.....
46	PBFZZ	81349	M39018/01-1018P	.CAPACITOR,FIXED,ELE.....
47	PBFZZ	56289	5GAS10	.CAPACITOR,FIXED,CER.....
48	PBFZZ	81349	JAN1N3020B	.SEMICONDUCTOR DEVIC.....
49	PBFZZ	81349	RCR07G220JS	.RESISTOR,FIXED,COMP.....
50	PBFZZ	81349	RCR07G105JS	.RESISTOR,FIXED,COMP.....
51	PBFZZ	81349	RCR07G332JS	.RESISTOR,FIXED,COMP.....
52	XAFZZ	99866	AW4200	.CIRCUIT BOARD,PHAZO.....

END OF FIGURE

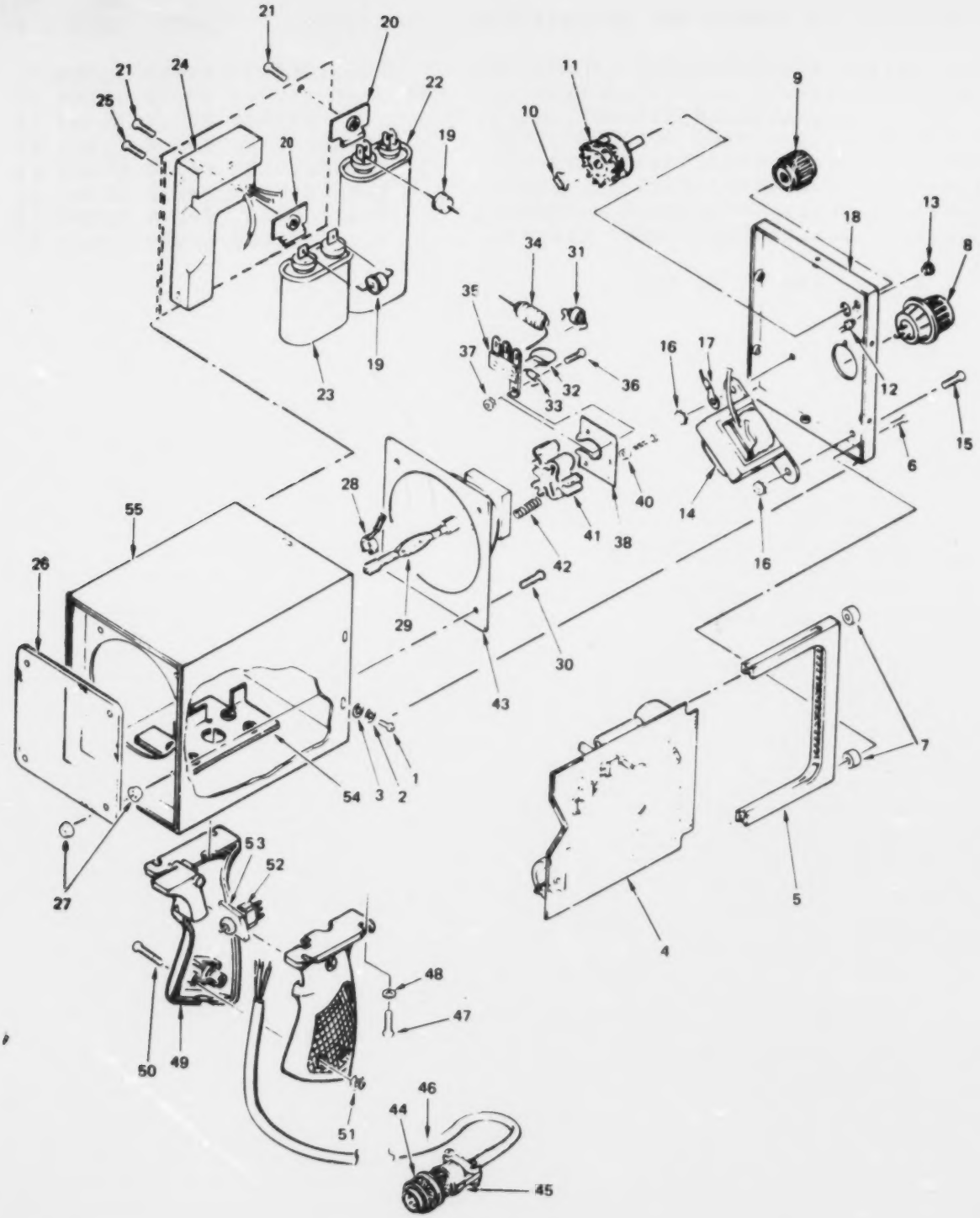
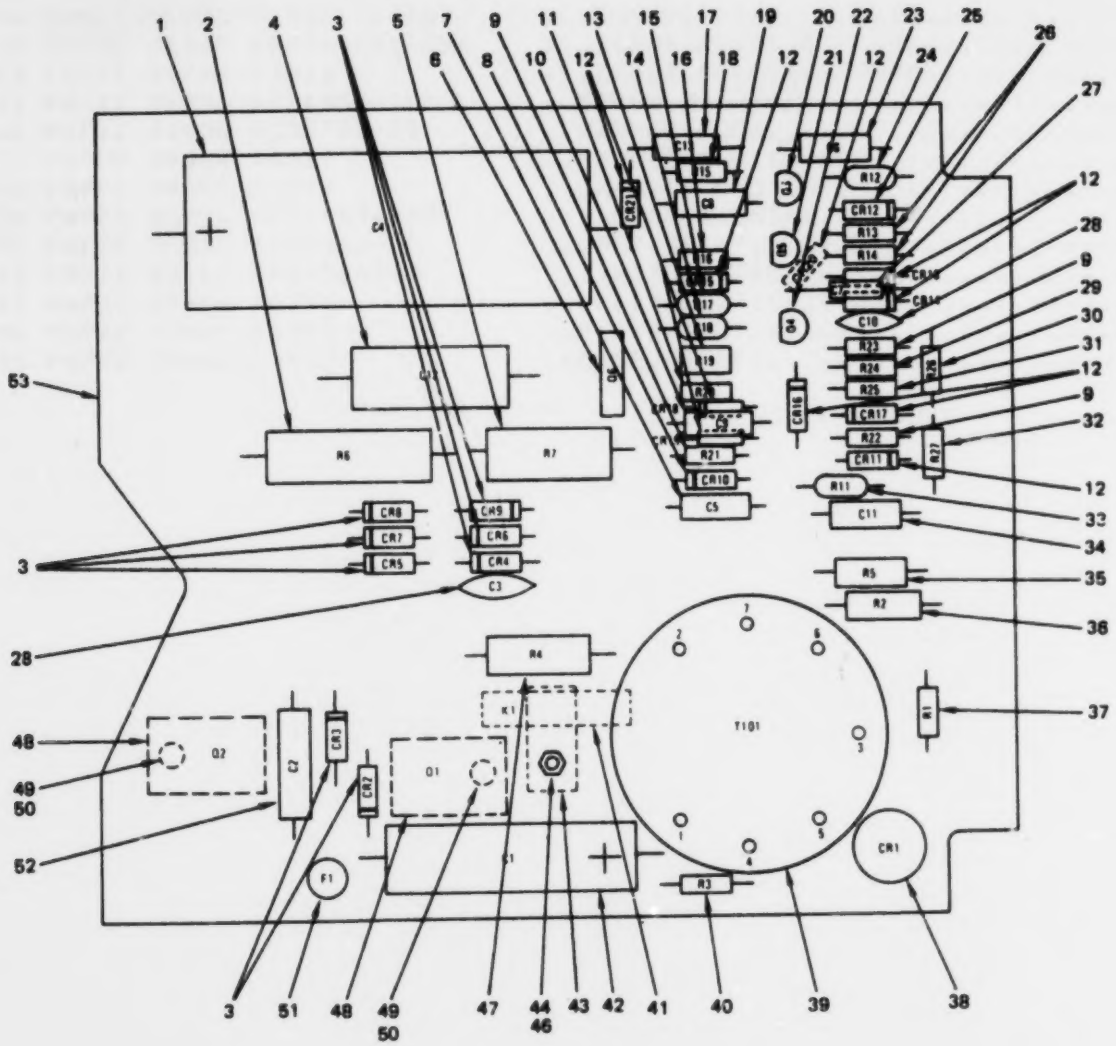


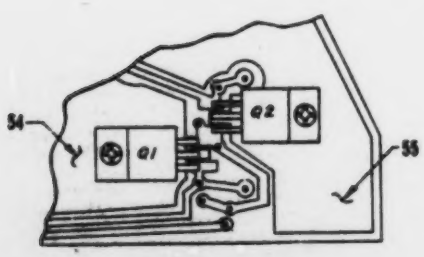
Figure C-5. Strobex Tracker

(1) ITEM NO.	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
				GROUP 05. STROBEX TRACKER ASSEMBLY	
				FIGURE C-5. STROBEX TRACKER	
	PBOFD	99866	135M11	TRACKER,BLADE	1
1	PAOZZ	96906	MS51957-13B	.SCREW,MACHINE	6
2	PAOZZ	96906	MS15795-804B	.WASHER,FLAT	6
3	PAOZZ	96906	MS35333-70	.WASHER,LOCK	6
	PBFFF	99866	A4006	.COVER ASSEMBLY,REAR	1
4	XCFFF	99866	C3984	..CIRCUIT CARD ASSEMB SEE FIGURE C-6 FOR BREAKDOWN	1
5	PBFZZ	96214	537238-1	..CONNECTOR,RECEPTACL	1
6	PAFZZ	96906	MS51957-17B	..SCREW,MACHINE	2
7	PBFZZ	99866	A4175	..SPACER	2
8	PBFZZ	80294	3610S1-503	..RESISTOR,VARIABLE,W	1
9	PBFZZ	49956	70-2WD2G	..KNOB	1
10	PBFZZ	81349	JAN1N3613	..SEMICONDUCTOR DEVIC	1
11	PBFZZ	71590	PSA207	..SWITCH,ROTARY	1
12	PBFZZ	04423	41-0118-01	..LIGHT EMITTING DIOD	1
13	PBFZZ	34148	FLS001	..HOLDER,DIODE	1
14	PBFZZ	99866	A3934	..REACTOR	1
15	PAFZZ	96906	MS51957-28B	..SCREW,MACHINE	2
16	PAFZZ	78189	511-061800-00	..NUT,PLAIN,ASSEMBLED	2
17	PBFZZ	96906	MS35431-3	..TERMINAL,LUG	1
18	PBFZZ	99866	B3971	..COVER,REAR,VIBREX	1
	PBFFZ	99866	A4005	.CASE ASSEMBLY,VIBRE	1
19	PBFZZ	81349	JAN1N5554	..SEMICONDUCTOR DEVIC	2
20	PBFZZ	99866	A3975	..RETAINER,CAPACITOR	2
21	PAFZZ	96906	MS51957-27B	..SCREW,MACHINE	2
22	PBFZZ	81133	951-401404	..CAPACITOR,FIXED,PAP	1
23	PBFZZ	14655	OTBG205K	..CAPACITOR,FIXED,PAP	1
24	PBFZZ	99866	A3993	..DIODE PACKAGE	1
25	PAFZZ	96906	MS51957-31B	..SCREW,MACHINE	3
26	PBFZZ	99866	A1436-1	..LENS,LIGHT	1
27	PAFZZ	96906	MS51865-1B	..NUT,SELF-LOCKING,CA	8
28	PBFZZ	75915	121002	..CLIP,ELECTRICAL	1
29	PBOZZ	99866	35S	..LAMP,SPECIAL	1
30	PAFZZ	96906	MS51957-30B	..SCREW,MACHINE	4
	PBFFF	99866	A3989	..LAMP	1
31	PBFZZ	81349	JAN1N5554	...SEMICONDUCTOR DEVIC	1
32	PBFZZ	56289	5GAS10	...CAPACITOR,FIXED,CER	1
33	PBFZZ	81349	RCR20G105JS	...RESISTOR,FIXED,COMP	1
34	PBFZZ	99866	A2670-1	...COIL,RADIO FREQUENC	1
35	PBFZZ	83330	1099	...TERMINAL BOARD	1
36	PAFZZ	96906	MS51957-26	...SCREW,MACHINE	1
37	PAFZZ	96906	MS21042-06	...NUT,SELF-LOCKING,EX	1
38	PBFZZ	99866	A2604	...ADAPTER,LAMP CLAMP	1
40	PBFZZ	99866	A4253	...INSULATOR,BUSHING	3
41	PBFZZ	99866	A2510	...EXTRUSION,LAMP CLAM	1
42	PBFZZ	99866	A2047	...SPRING,HELICAL,C	3
43	PBFZZ	99866	A3988	...REFLECTOR, SUBASSEM	1
	PBFZZ	99866	A2917	..CABLE ASSEMBLY,SPEC	1

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
44	PBFZZ	96906	MS3106A14S5P	...CONNECTOR,PLUG,ELEC.....	
45	PBFZZ	81349	M85049/41-16A	...CLAMP,CABLE,ELECTRI.....	
46	PBFZZ	99866	A2916	...CABLE,SPECIAL PURPO.....	
47	PAFZZ	96906	MS51957-28B	..SCREW,MACHINE.....	
48	PAFZZ	96906	MS35333-71	..WASHER,LOCK.....	
	PBFFF	99866	A6839	..HANDLE AND TRIGGER.....	
49	PBFFZ	99866	D4597	...HANDLE AND TRIGGER.....	
50	PAFZZ	96906	MS51957-34B	...SCREW,MACHINE.....	
51	PAFZZ	96906	MS21042-06	...NUT,SELF-LOCKING,EX.....	
52	PBFZZ	95146	MPA-904749	...SWITCH,SPECIAL.....	
53	PBFZZ	99866	A4714	...PLATE,SWITCH,VIBREX.....	
54	PBFZZ	99866	B4713	..PLATE,STOP,VIBREX.....	
55	PBFFZ	99866	C3972	..CASE,VIBREX.....	

END OF FIGURE





FOIL VIEW SECTION

Figure C-6. Blade Tracker Circuit Assembly

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
				GROUP 06. BLADE TRACKER CARD ASSEMBLY	
				FIGURE C-6. BLADE TRACKER CIRCUIT ASSEMBLY	
	PBFFZ	99866	C3984	CIRCUIT CARD ASSEMB.....	1
1	PBFZZ	56289	TVA1613	.CAPACITOR,FIXED,ELE.....	1
2	PBFZZ	44655	4642	.RESISTOR,FIXED,WIRE.....	1
3	PBFZZ	81349	JAN1N3613	.SEMICONDUCTOR DEVIC.....	8
4	PBFZZ	25088	B32231-22-10-400	.CAPACITOR,FIXED,MET.....	1
5	PBFZZ	81349	RCR42G683JS	.RESISTOR,FIXED,COMP.....	1
6	PBFZZ	04713	2N4443	.SEMICONDUCTOR DEVIC.....	1
7	PBFZZ	81349	M39003/01-3006	.CAPACITOR,FIXED,ELE.....	1
8	PBFZZ	81349	JAN1N4467	.SEMICONDUCTOR DEVIC.....	1
9	PBFZZ	81349	RCR07G103JS	.RESISTOR,FIXED,COMP.....	3
10	PBFZZ	56289	292P15352	.CAPACITOR,FIXED,PLA.....	1
11	PBFZZ	81349	RCR07G222JS	.RESISTOR,FIXED,COMP.....	1
12	PBFZZ	81349	JAN1N914	.SEMICONDUCTOR DEVIC.....	10
13	PBFZZ	73138	72RXW10K	.RESISTOR,VARIABLE,N.....	1
14	PBFZZ	81349	RNC60K1912FS	.RESISTOR,FIXED,FILM.....	1
15	PBFZZ	81349	RNC60K1002FS	.RESISTOR,FIXED,FILM.....	1
16	PBFZZ	81349	RCR07G105JS	.RESISTOR,FIXED,COMP.....	1
17	PBFZZ	56289	192P10352	.CAPACITOR,FIXED,PLA.....	1
18	PBFZZ	81349	RCR07G101JS	.RESISTOR,FIXED,COMP.....	1
19	PBFZZ	81349	CFR06ARB223FM	.CAPACITOR,FIXED,MET.....	1
20	PBFZZ	04713	2N3906	.TRANSISTOR.....	1
21	PBFZZ	04713	MPU132	.TRANSISTOR.....	1
22	PBFZZ	04713	2N3904	.TRANSISTOR.....	1
23	PBFZZ	27556	BA2A204F	.CAPACITOR,FIXED,MET.....	1
24	PBFZZ	81349	RNC60K1003FS	.RESISTOR,FIXED,FILM.....	1
25	PBFZZ	81349	JAN1N483B	.SEMICONDUCTOR DEVIC.....	1
26	PBFZZ	81349	RCR07G473JS	.RESISTOR,FIXED,COMP.....	2
27	PBFZZ	27556	BA2A663F	.CAPACITOR,FIXED,MET.....	1
28	PBFZZ	96095	BCD1-6-103GMV1KV	.CAPACITOR,FIXED,CER.....	2
29	PBFZZ	81349	RCR07G562JS	.RESISTOR,FIXED,COMP.....	1
30	PBFZZ	81349	RCR07G154JS	.RESISTOR,FIXED,COMP.....	1
31	PBFZZ	81349	RCR07G683JS	.RESISTOR,FIXED,COMP.....	1
32	PBFZZ	81349	RCR07G153JS	.RESISTOR,FIXED,COMP.....	1
33	PBFZZ	81349	RNC60K1503FS	.RESISTOR,FIXED,FILM.....	1
34	PBFZZ	81349	CFR06ARB223FM	.CAPACITOR,FIXED,MET.....	1
35	PBFZZ	81349	RCR20G105JS	.RESISTOR,FIXED,COMP.....	1
36	PBFZZ	81349	RCR20G102JS	.RESISTOR,FIXED,COMP.....	1
37	PBFZZ	81349	RCR20G272JS	.RESISTOR,FIXED,COMP.....	1
38	PBFZZ	04713	1N5001	.SEMICONDUCTOR DEVIC.....	1
39	PBFZZ	99866	A3943	.TRANSFORMER,POWER.....	1
40	PBFZZ	81349	RCR07G332JS	.RESISTOR,FIXED,COMP.....	1
41	PBFZZ	79318	K19	.RELAY,ELECTROMAGNET.....	1
42	PBFZZ	56289	TVA1311	.CAPACITOR,FIXED,ELE.....	1
43	PBFZZ	99866	A4421	.CLIP,ELECTRICAL.....	1
44	PAFZZ	96906	MS51957-13	.SCREW,MACHINE.....	1
46	PAFZZ	78189	511-041800-00	.NUT,PLAIN,ASSEMBLED.....	1

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
47	PBFZZ	81349	RWR80U3R90F	.RESISTOR,FIXED,COMP.....	1
48	PBFZZ	02735	2N6292	.TRANSISTOR.....	2
49	PAFZZ	96906	MS51957-15	.SCREW,MACHINE.....	2
50	PAFZZ	78189	511-041800-00	.NUT,PLAIN,ASSEMBLED.....	2
51	PAFZZ	81349	FM02-125V-5A	.FUSE,CARTRIDGE,5A.....	V
52	PBFZZ	56289	292P10452	.CAPACITOR,FIXED,PLA.....	1
53	XAFZZ	99866	AW3983	.CIRCUIT BOARD,VIBRE.....	1
54	PBFZZ	99866	A4085-1	.HEATSINK,VIBREX.....	1
55	PBFZZ	99866	A4085-2	.HEATSINK,VIBREX.....	1

END OF FIGURE

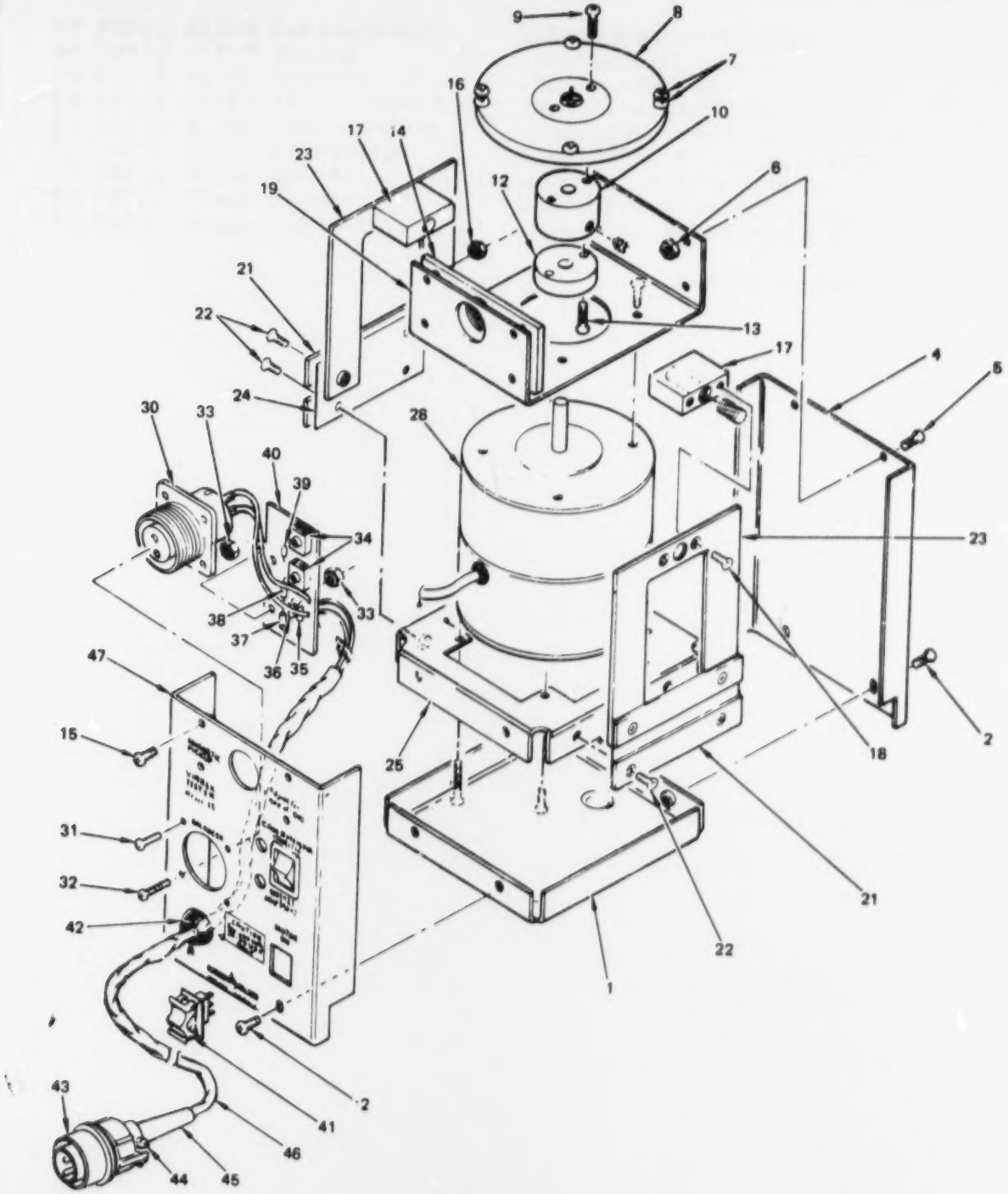


Figure C-7. Vibrex Tester

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
				GROUP 07. VIBREX TESTER ASSEMBLY	
				FIGURE C-7. VIBREX TESTER	
	PBOFF	99866	11	STROBOSCOPE	1
1	PBFZZ	99866	B4578	.PANEL,BOTTOM,VIBREX	1
2	PAFZZ	96906	MS51957-28B	.SCREW,MACHINE	4
4	PBFZZ	99866	B4580	.PANEL,REAR,VIBREX	1
5	PAFZZ	96906	MS51957-28B	.SCREW,MACHINE	4
6	PAFZZ	78189	511-061800-00	.NUT,PLAIN,ASSEMBLED	4
7	PAFZZ	96906	MS51957-30	.SCREW,MACHINE	6
8	PBFZZ	99866	A4576	.DISC,ROTOR,VIBREX	1
9	PAFZZ	96906	MS51957-15B	.SCREW,MACHINE	2
10	PBFZZ	99866	A4577	.HUB,ROTOR,VIBREX	1
12	PBFZZ	99866	C4264	.CAM PROFILE,VIBREX	1
13	PAFZZ	96906	MS51957-15B	.SCREW,MACHINE	2
14	PBFZZ	99866	A4543	.DOUBLER,VIBREX	1
15	PAFZZ	96906	MS51957-28B	.SCREW,MACHINE	4
16	PAFZZ	78189	511-061800-00	.NUT,PLAIN,ASSEMBLED	4
17	PBFZZ	99866	A4536	.FOLLOWER,CAM,VIBREX	2
18	PAFZZ	96906	MS51959-26	.SCREW,MACHINE	4
19	PBFZZ	99866	B4539	.BRACKET,MAGNETIC VI	1
21	PBFZZ	99866	A4537	.CLAMP,VIBREX	4
22	PAFZZ	96906	MS51957-28	.SCREW,MACHINE	8
23	PBFZZ	99866	B4540	.ACCELEROMETER ARM,V	2
24	PBFZZ	99866	A4538	.SPRING,FLAT	2
25	PBFZZ	99866	B4541	.BASE,VIBREX	1
28	PBFZZ	99866	NHM-5FTC	.MOTOR,ELECTRONICS,V	1
30	PBFZZ	96906	MS3102R16-11S	.CONNECTOR,RECEPTACL	1
31	PAFZZ	96906	MS51957-15B	.SCREW,MACHINE	2
32	PAFZZ	96906	MS51957-17B	.SCREW,MACHINE	2
33	PAFZZ	78189	511-041800-00	.NUT,PLAIN,ASSEMBLED	6
	PBFFZ	99866	A4614	.CIRCUIT BOARD,VIBRE	1
34	PBFZZ	73138	72RXW1K	..RESISTOR,VARIABLE,N	2
35	PBFZZ	81349	RNC60K1001FS	..RESISTOR,FIXED,FILM	1
36	PBFZZ	81349	RNC60K2001FS	..RESISTOR,FIXED,FILM	1
37	PBFZZ	04713	1N4753A	..SEMICONDUCTOR DEVIC	1
38	PBFZZ	81349	JAN1N3613	..SEMICONDUCTOR DEVIC	1
39	PBOZZ	75915	275-002	..FUSE,CARTRIDGE	1
40	XAFZZ	99866	AW4581	..CIRCUIT BOARD,VIBRE	1
41	XDFZZ	09353	7101-J3-ZG	.SWITCH,TOGGLE	2
42	PBFZZ	28520	6P-4	.SUPPORT,SPECIAL,VIB	1
	PBFZZ	99866	A4185	.CABLE ASSEMBLY,POWE	1
43	PBFZZ	96906	MS3106A16-11P	..CONNECTOR,PLUG,ELEC	1
44	XDFZZ	81349	M85049/41-8W	..CLAMP,CABLE,ELECTRI	1
45	PBFZZ	02660	9779-513-6	..BUSHING,RUBBER	1
46	PBFZZ	99866	A4335	..CABLE,SPECIAL PURPO	10
47	PBFZZ	99866	B4579	.PANEL,FRONT,VIBREX	1
56	PBOZZ	99866	A3471	CHART,BALANCE	
				END OF FIGURE	

NATIONAL STOCK NUMBER AND PART NUMBER INDEX

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM
5910-00-007-2001	C-3	31
5910-00-007-2004	C-3	22
5940-00-050-2308	C-5	17
5935-00-050-5387	C-5	5
5305-00-054-5647	C-6	44
5305-00-054-5649	C-6	49
5305-00-054-6650	C-5	36
5305-00-054-6652	C-2	9
	C-2	13
	C-7	22
5305-00-054-6654	C-7	7
5961-00-059-2904	C-2	50
	C-3	20
	C-5	10
	C-6	3
	C-7	38
5310-00-063-7360	C-5	16
	C-7	6
	C-7	16
5961-00-089-3576	C-3	12
	C-7	37
5905-00-104-5756	C-5	33
	C-6	35
5905-00-104-8358	C-3	44
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5905-00-110-7620	C-3	39
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5905-00-116-8556	C-3	38
5905-00-118-4559	C-3	63
5905-00-119-3505	C-6	31
5905-00-126-6683	C-3	34
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5905-00-140-7142	C-3	55
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5905-00-141-1149	C-3	33
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5905-00-154-0068	C-6	5
6240-00-155-8714	C-1	15
5961-00-158-4786	C-3	18
5961-00-162-9780	C-3	19
5999-00-177-1694	C-5	28
6210-00-181-2556	C-5	26
5360-00-182-5494	C-2	22
	C-5	42
5305-00-182-9459	C-5	6
	C-7	32
5910-00-186-9286	C-4	13
5905-00-189-2454	C-3	51
5905-00-189-2477	C-3	43
5905-00-192-3876	C-6	33
5905-00-192-3880	C-3	58
5905-00-192-3882	C-3	59
5940-00-192-9962	C-5	35

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STOCK NUMBER	FIG.	ITEM
5905-00-195-6384	C-3	50
5935-00-199-3335	C-1	35
	C-2	3
	C-7	43
5935-00-201-7983	C-5	44
5945-00-201-8667	C-6	41
5905-00-208-4285	C-3	57
	C-6	13
5950-00-211-2158	C-5	34
5961-00-232-3808	C-3	7
5930-00-240-6008	C-5	11
5305-00-242-7275	C-2	36
	C-2	39
	C-2	42
	C-2	45
	C-7	9
	C-7	13
	C-7	31
5961-00-247-1442	C-3	21
5961-00-274-2545	C-5	13
5962-00-324-2195	C-4	27
5905-00-365-5560	C-3	61
5962-00-369-7621	C-4	29
5962-00-378-0216	C-4	30
5935-00-400-4847	C-2	41
5905-00-426-7095	C-3	32
	C-6	15
5905-00-426-7121	C-3	56
5305-00-428-0732	C-5	50
5905-00-432-6410	C-7	35
5961-00-433-5809	C-4	17
5905-00-435-6374	C-3	64
5905-00-436-2056	C-4	43
5305-00-448-6456	C-5	25
5305-00-448-6500	C-2	11
	C-2	15
	C-5	15
	C-5	47
	C-7	2
	C-7	5
	C-7	15
5305-00-448-6547	C-5	21
5905-00-451-7414	C-3	49
	C-4	11
5905-00-451-7532	C-3	66
5910-00-463-9490	C-3	15
5961-00-469-2189	C-5	19
	C-5	31
5305-00-469-5382	C-5	30
5910-00-494-6088	C-4	19
5305-00-494-7333	C-2	2
	C-5	1
6240-00-498-2714	C-1	26
	C-5	29
5910-00-506-7011	C-6	10
5910-00-506-7036	C-3	9
	C-4	9
5935-00-539-2651	C-1	42
5310-00-550-3715	C-5	3
5961-00-556-2091	C-4	20
5961-00-568-8661	C-4	28
	C-5	12
5910-00-577-1138	C-6	28
5940-00-578-9896	C-2	16
5962-00-595-8504	C-4	24
5910-00-615-4674	C-6	1
5975-00-616-0546	C-2	48
5310-00-616-3555	C-2	24
	C-5	48
5961-00-618-9955	C-6	21
5355-00-628-4509	C-2	28
5950-00-645-3699	C-3	17
5340-00-678-6450	C-1	46
5961-00-682-0673	C-6	38
5940-00-682-2477	C-2	47
5935-00-686-0038	C-1	36
5310-00-687-6664	C-5	2
5935-00-688-4026	C-1	8
	C-1	37
5961-00-728-6941	C-2	35
5962-00-740-5873	C-4	22
5305-00-763-6961	C-7	18
5930-00-779-6723	C-2	32
5920-00-782-6179	C-6	51
5910-00-783-7899	C-6	42
5310-00-807-1465	C-2	25
	C-5	37
	C-5	51
5935-00-807-9308	C-2	38
5920-00-811-8879	C-7	39
5910-00-821-5215	C-3	4
5910-00-822-3765	C-3	23
	C-4	7
5961-00-826-9048	C-4	48
5910-00-828-5705	C-3	14
	C-4	47
	C-5	32
5905-00-833-4321	C-6	2
5310-00-836-3520	C-2	37
	C-2	40

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5310-00-836-3520	C-2	43
	C-2	46
	C-6	46
	C-6	50
	C-7	33
5910-00-838-9421	C-4	3
5961-00-842-9864	C-4	4
	C-6	12
5910-00-852-4039	C-4	37
5935-00-878-6943	C-1	7
	C-7	30
5961-00-892-0734	C-3	1
	C-6	25
5961-00-892-8706	C-3	13
	C-4	38
	C-6	22
5920-00-908-1929	C-3	16
5961-00-931-0372	C-3	8
	C-4	16
	C-6	20
5310-00-933-8118	C-2	19
5310-00-934-9748	C-2	20
5910-00-937-1328	C-3	3
	C-4	12
5910-00-965-9729	C-4	5
	C-6	17
5355-00-994-3435	C-5	9
9390-01-004-5480	C-1	23
6670-01-005-8021	C-1	4
7610-01-006-4428	C-1	59
5910-01-006-7757	C-3	29
5910-01-007-4094	C-3	24
5910-01-008-6755	C-3	25
5910-01-014-3285	C-4	6
5365-01-018-5455	C-2	5
	C-7	45
5910-01-022-5082	C-6	4
4920-01-023-5189	C-5	38
4920-01-023-5191	C-5	41
5910-01-027-9478	C-4	26
5935-01-028-9329	C-4	42
5305-01-029-8876	C-2	23
5905-01-030-2894	C-3	60
5910-01-031-1451	C-4	18
5910-01-032-1819	C-3	10
	C-6	52
4920-01-037-4089	C-5	
5961-01-039-7384	C-6	48
5340-01-039-8020	C-2	14
5962-01-039-9414	C-3	5
5962-01-039-9414	C-4	41
5962-01-040-1425	C-4	33
4920-01-042-8519	C-2	
6240-01-043-3258	C-5	
6240-01-043-3259	C-5	43
6930-01-043-9621	C-5	52
5930-01-044-4117	C-2	49
5950-01-044-8757	C-5	14
5910-01-045-0114	C-5	23
5970-01-045-0711	C-5	40
6625-01-045-7003	C-2	17
5950-01-045-7710	C-6	39
5905-01-045-8019	C-5	8
5910-01-045-8170	C-5	20
4920-01-046-7352	C-2	26
4920-01-046-7353	C-2	10
4920-01-046-7354	C-5	7
4920-01-046-7357	C-1	28
4920-01-046-7359	C-1	56
6150-01-046-7396	C-2	
	C-7	
4920-01-046-7422	C-4	
4920-01-046-7423	C-3	
4920-01-046-8674	C-5	24
6150-01-047-7064	C-5	
6150-01-047-8111	C-1	38
5905-01-048-4262	C-2	21
5910-01-055-7758	C-6	23
5910-01-055-8412	C-6	27
5962-01-057-7884	C-3	26
5930-01-061-8093	C-2	33
5935-01-064-1580	C-4	23
6635-01-070-9566	C-1	16
6625-01-077-8349	C-7	
5935-01-079-3215	C-1	9
5935-01-083-4122	C-4	25
4920-01-086-1500	C-7	12
4920-01-086-1501	C-7	14
4920-01-086-1502	C-3	6
4920-01-086-1503	C-7	21
4920-01-086-1504	C-7	19
4920-01-086-1505	C-5	
4920-01-086-1506	C-1	34
4920-01-086-1508	C-5	18
4920-01-086-1509	C-1	6
4920-01-086-1510	C-1	14
4920-01-086-1511	C-1	10
4920-01-086-1512	C-5	54
4920-01-086-1513	C-5	53
4920-01-086-1514	C-1	20

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4920-01-086-1515	C-1	29
4920-01-086-1517	C-1	19
4920-01-086-1518	C-1	18
4920-01-086-1520	C-1	22
4920-01-086-1521	C-1	24
4920-01-086-1522	C-1	31
4920-01-086-1523	C-1	30
4920-01-086-1524	C-1	21
5995-01-087-0820	C-1	43
5995-01-087-0821	C-1	44
4920-01-087-1613	C-7	17
4920-01-087-1614	C-7	8
4920-01-087-1615	C-7	10
4920-01-087-1616	C-7	23
4920-01-087-1617	C-7	25
4920-01-087-1618	C-7	1
4920-01-087-1619	C-7	47
4920-01-087-1620	C-7	4
4920-01-087-1621	C-2	1
4920-01-087-1622	C-2	27
4920-01-087-1627	C-2	7
	C-7	42
4920-01-087-4200	C-6	54
4920-01-087-4201	C-6	55
4920-01-087-4233	C-5	
4920-01-087-9156	C-2	51
4920-01-089-0445	C-5	49
4920-01-089-0447	C-1	27
4920-01-089-0448	C-5	55
1615-01-089-8578	C-1	52
4920-01-093-4770	C-7	28
4920-01-093-4771	C-7	
4920-01-093-4772	C-5	
4920-01-093-4775	C-1	17
5970-01-094-1581	C-2	
5360-01-094-6945	C-7	24
5930-01-095-2022	C-2	34
5930-01-095-2023	C-2	31
5910-01-095-2239	C-3	27
5930-01-095-2262	C-2	30
5999-01-095-2311	C-6	43
5930-01-095-4075	C-2	29
5910-01-095-6185	C-5	22
5905-01-095-9938	C-3	54
5905-01-095-9940	C-3	62
5905-01-095-9941	C-7	34
5310-01-096-7381	C-5	27
7610-01-123-3221	C-1	60
7610-01-123-3223	C-1	58
7610-01-123-3224	C-1	53
7610-01-123-3225	C-1	55
7610-01-123-3226	C-1	57
7610-01-123-3227	C-1	61
7610-01-131-9691	C-1	51
7610-01-132-0157	C-1	49
7610-01-136-9822	C-1	49
5935-01-137-2305	C-5	45
5905-01-138-6236	C-4	32
7610-01-165-2799	C-1	54
4920-01-173-4537	C-1	32
4920-01-173-4538	C-1	33
5910-01-187-1629	C-6	19
	C-6	34
5935-01-196-1068	C-1	39
5910-01-200-8343	C-4	46
5905-01-208-6335	C-4	10
6145-01-211-3376	C-2	6
	C-7	46

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99866	AW3983		C-6	53
99866	AW4133		C-3	69
99866	AW4200		C-4	52
99866	AW4581		C-7	40
99866	A1436-1	6210-00-181-2556	C-5	26
99866	A2047	5360-00-182-5494	C-2	22
			C-5	42
99866	A2510	4920-01-023-5191	C-5	41
99866	A2604	4920-01-023-5189	C-5	38
99866	A2670-1	5950-00-211-2158	C-5	34
99866	A2916		C-5	46
99866	A2917	6150-01-047-7064	C-5	
99866	A3104	4920-01-086-1520	C-1	22
99866	A3160		C-1	25
99866	A3300	9390-01-004-5480	C-1	23
99866	A3307	6625-01-045-7003	C-2	17
99866	A3319-2	6150-01-047-8111	C-1	38
99866	A3382	4920-01-086-1514	C-1	20
99866	A3383	4920-01-086-1524	C-1	21
99866	A3387	4920-01-086-1517	C-1	19
99866	A3428-2	4920-01-086-1518	C-1	18
99866	A3471	4920-01-046-7359	C-1	56
99866	A3529	4920-01-086-1506	C-1	34
99866	A3934	5950-01-044-8757	C-5	14
99866	A3943	5950-01-045-7710	C-6	39
99866	A3975	5910-01-045-8170	C-5	20
99866	A3988	6240-01-043-3259	C-5	43
99866	A3989	6240-01-043-3258	C-5	
99866	A3993	4920-01-046-8674	C-5	24
99866	A4005	4920-01-093-4772	C-5	
99866	A4006	4920-01-087-4233	C-5	
99866	A4085-1	4920-01-087-4200	C-6	54
99866	A4085-2	4920-01-087-4201	C-6	55
99866	A4175	4920-01-046-7354	C-5	7
99866	A4185	6150-01-046-7396	C-2	
			C-7	
99866	A4253	5970-01-045-0711	C-5	40
99866	A4269		C-1	41
99866	A4296-1	5995-01-087-0820	C-1	43
99866	A4296-2	5995-01-087-0821	C-1	44
99866	A4335	6145-01-211-3376	C-2	6
			C-7	46
99866	A4338	4920-01-046-7352	C-2	26
99866	A4381-1	4920-01-046-7353	C-2	10
99866	A4421	5999-01-095-2311	C-6	43
99866	A4536	4920-01-087-1613	C-7	17
99866	A4537	4920-01-086-1503	C-7	21
99866	A4538	5360-01-094-6945	C-7	24
99866	A4543	4920-01-086-1501	C-7	14
99866	A4576	4920-01-087-1614	C-7	8
99866	A4577	4920-01-087-1615	C-7	10

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FSCM	PART NUMBER	STOCK NUMBER	FIG.	ITEM
99866	A4614	4920-01-093-4771	C-7	
99866	A4714	4920-01-086-1513	C-5	53
99866	A6839	4920-01-086-1505	C-5	
27556	BA2A204F	5910-01-055-7758	C-6	23
27556	BA2A543F	5910-01-008-6755	C-3	25
27556	BA2A593F	5910-01-095-2239	C-3	27
27556	BA2A602F	5910-01-007-4094	C-3	24
27556	BA2A663F	5910-01-055-8412	C-6	27
96095	BCD1-6-103GMV1KV	5910-00-577-1138	C-6	28
99866	B3103-1	4920-01-173-4537	C-1	32
99866	B3103-2	4920-01-173-4538	C-1	33
99866	B3140-1	4920-01-086-1509	C-1	6
99866	B3140-5	4920-01-086-1511	C-1	10
99866	B3140-9	4920-01-086-1510	C-1	14
25088	B32231-22-10-400	5910-01-022-5082	C-6	4
99866	B3251	4920-01-086-1515	C-1	29
99866	B3380	4920-01-089-0447	C-1	27
99866	B3971	4920-01-086-1508	C-5	18
99866	B4193		C-2	12
		4920-01-046-7422	C-4	
99866	B4305	4920-01-046-7357	C-1	28
99866	B4539	4920-01-086-1504	C-7	19
99866	B4540	4920-01-087-1616	C-7	23
99866	B4541	4920-01-087-1617	C-7	25
99866	B4578	4920-01-087-1618	C-7	1
99866	B4579	4920-01-087-1619	C-7	47
99866	B4580	4920-01-087-1620	C-7	4
99866	B4713	4920-01-086-1512	C-5	54
32767	B506	5355-00-628-4509	C-2	28
71468	CA3106A-10SL-3P		C-1	45
14655	CD15FD501G03	5910-00-852-4039	C-4	37
81349	CFR06AR8223FM	5910-01-187-1629	C-6	19
			C-6	34
81349	CK60AW102M	5910-00-838-9421	C-4	3
81349	CK60AX471K	5910-00-821-5215	C-3	4
81349	CK60BX101K	5910-00-822-3765	C-3	23
			C-4	7
60705	C016B102E271K	5910-00-494-6088	C-4	19
99866	C3972	4920-01-089-0448	C-5	55
99866	C3984		C-5	4
			C-6	
99866	C4124	4920-01-087-9156	C-2	51
99866	C4125	4920-01-087-1621	C-2	1
99866	C4146		C-2	8
		4920-01-046-7423	C-3	
99866	C4264	4920-01-086-1500	C-7	12
99866	C4559	4920-01-086-1523	C-1	30
99866	C4758	4920-01-086-1522	C-1	31
99866	D4597	4920-01-089-0445	C-5	49
34148	FLS001	5961-00-274-2545	C-5	13
81349	FM02-125V-5A	5920-00-782-6179	C-6	51

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95146	G12B	5975-00-616-0546	C-2	48
05079	HV3.9-450C4LP1	5910-00-186-9286	C-4	13
06776	ICN-083-S3-G	5935-01-028-9329	C-4	42
06776	ICN-143-S3-G	5935-01-064-1580	C-4	23
06776	ICN-163-S3-G	5935-01-083-4122	C-4	25
81349	JAN1N270	5961-00-556-2091	C-4	20
81349	JAN1N3020B	5961-00-826-9048	C-4	48
81349	JAN1N3613	5961-00-059-2904	C-2	50
			C-3	20
			C-5	10
			C-6	3
			C-7	38
81349	JAN1N4460	5961-00-158-4786	C-3	18
81349	JAN1N4464	5961-00-232-3808	C-3	7
81349	JAN1N4467	5961-00-147-9600	C-6	8
81349	JAN1N4838	5961-00-892-0734	C-3	1
			C-6	25
81349	JAN1N5554	5961-00-469-2189	C-5	19
			C-5	31
81349	JAN1N914	5961-00-842-9864	C-4	4
			C-6	12
79318	K19	5945-00-201-8667	C-6	41
04713	MC939L	5962-00-740-5873	C-4	22
95146	MPA-904749	6930-01-043-9621	C-5	52
04713	MPSA56	5961-00-162-9780	C-3	19
04713	MPU132	5961-00-618-9955	C-6	21
96906	MS15795-804B	5310-00-687-6664	C-5	2
96906	MS21042-06	5310-00-807-1465	C-2	25
			C-5	37
			C-5	51
96906	MS25231-313	6240-00-155-8714	C-1	15
96906	MS3057-4A		C-1	40
96906	MS3057-8A	5935-00-688-4026	C-1	8
			C-1	37
96906	MS3102E10SL4S		C-2	44
96906	MS3102R10SL3S	5935-00-400-4847	C-2	41
96906	MS3102R14S5S	5935-00-807-9308	C-2	38
96906	MS3102R16-11S	5935-00-878-6943	C-1	7
			C-7	30
96906	MS3106A10SL4S	5935-00-539-2651	C-1	42
96906	MS3106A14S5P	5935-00-201-7983	C-5	44
96906	MS3106A16-11P	5935-00-199-3335	C-1	35
			C-2	3
			C-7	43
96906	MS3106A16-11SC	5935-00-686-0038	C-1	36
96906	MS3367-5	5975-00-111-3208	C-1	62
96906	MS3456W10SL-4P	5935-01-196-1068	C-1	39
96906	MS35333-70	5310-00-550-3715	C-5	3
96906	MS35333-71	5310-00-616-3555	C-2	24
			C-5	48
96906	MS35338-135	5310-00-933-8118	C-2	19

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96906	MS35431-3	5940-00-050-2308	C-5	17
96906	MS35649-244	5310-00-934-9748	C-2	20
96906	MS51865-1B	5310-01-096-7381	C-5	27
96906	MS51957-13	5305-00-054-5647	C-6	44
96906	MS51957-13B	5305-00-494-7333	C-2	2
			C-5	1
96906	MS51957-15	5305-00-054-5649	C-6	49
96906	MS51957-15B	5305-00-242-7275	C-2	36
			C-2	39
			C-2	42
			C-2	45
			C-7	9
			C-7	13
			C-7	31
96906	MS51957-17B	5305-00-182-9459	C-5	6
			C-7	32
96906	MS51957-26	5305-00-054-6650	C-5	36
96906	MS51957-27B	5305-00-448-6547	C-5	21
96906	MS51957-28	5305-00-054-6652	C-2	9
			C-2	13
			C-7	22
96906	MS51957-28B	5305-00-448-6500	C-2	11
			C-2	15
			C-5	15
			C-5	47
			C-7	2
			C-7	5
			C-7	15
96906	MS51957-30	5305-00-054-6654	C-7	7
96906	MS51957-30B	5305-00-469-5382	C-5	30
96906	MS51957-31B	5305-00-448-6456	C-5	25
96906	MS51957-34B	5305-00-428-0732	C-5	50
96906	MS51957-36B	5305-01-029-8876	C-2	23
96906	MS51959-26	5305-00-763-6961	C-7	18
96906	MS77068-1	5940-00-682-2477	C-2	47
81349	M38510/00202BCB	5962-00-369-7621	C-4	29
81349	M38510/00303BCB	5962-00-378-0216	C-4	30
81349	M38510/01005BEB	5962-00-324-2195	C-4	27
81349	M38510/01501BEB	5962-00-595-8504	C-4	24
81349	M38510/10101BPC	5962-01-057-7884	C-3	26
81349	M38510/10802BCB	5962-01-040-1425	C-4	33
81349	M39003/01-2966	5910-00-007-2001	C-3	31
81349	M39003/01-2993	5910-00-113-9906	C-3	30
81349	M39003/01-3006	5910-00-113-5475	C-3	28
			C-6	7
81349	M39003/01-3088	5910-00-007-2004	C-3	22
81349	M39014/02-1350	5910-00-113-5499	C-3	11
81349	M39018/01-1018P	5910-01-200-8343	C-4	46
81349	M85049/41-16A	5935-01-137-2305	C-5	45
81349	M85049/41-8W		C-2	4
			C-7	44

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FSCM	PART NUMBER	STOCK NUMBER	FIG.	ITEM
99866	NHM-5FTC	4920-01-093-4770	C-7	28
14655	OTBG205K	5910-01-045-0114	C-5	23
71590	PSA-214	5930-01-095-4075	C-2	29
71590	PSA207	5930-00-240-6008	C-5	11
77820	PT06P8-3S		C-1	47
81349	RCR07G100JS	5905-00-107-0656	C-3	48
81349	RCR07G101JS	5905-00-141-1183	C-3	47
			C-6	18
81349	RCR07G102JS	5905-00-110-7620	C-3	39
			C-4	34
81349	RCR07G103JS	5905-00-106-3666	C-3	37
			C-4	2
			C-6	9
81349	RCR07G104JS	5905-00-110-0388	C-3	35
			C-4	36
81349	RCR07G105JS	5905-00-116-8554	C-3	65
			C-4	50
			C-6	16
81349	RCR07G150JS	5905-00-135-3971	C-3	40
81349	RCR07G152JS	5905-00-106-1356	C-3	46
81349	RCR07G153JS	5905-00-116-8555	C-6	32
81349	RCR07G154JS	5905-00-114-5339	C-6	30
81349	RCR07G220JS	5905-00-106-3668	C-4	49
81349	RCR07G221JS	5905-00-135-3973	C-3	68
			C-4	35
81349	RCR07G222JS	5905-00-105-7764	C-3	36
			C-6	11
81349	RCR07G223JS	5905-00-116-8556	C-3	38
81349	RCR07G332JS	5905-00-126-6683	C-3	34
			C-4	51
			C-6	40
81349	RCR07G333JS	5905-00-118-4559	C-3	63
81349	RCR07G390JS	5905-00-113-4861	C-4	44
81349	RCR07G392JS	5905-00-141-0743	C-4	40
81349	RCR07G472JS	5905-00-114-0711	C-4	21
81349	RCR07G473JS	5905-00-141-0717	C-3	41
			C-4	1
			C-6	26
81349	RCR07G475JS	5905-00-126-6694	C-4	8
81349	RCR07G562JS	5905-00-141-0744	C-4	39
			C-6	29
81349	RCR07G680JS	5905-01-138-6236	C-4	32
81349	RCR07G681JS	5905-00-135-6046	C-4	31
81349	RCR07G683JS	5905-00-119-3505	C-6	31
81349	RCR07G822JS	5905-00-104-8358	C-3	44
			C-4	15
81349	RCR07G823JS	5905-00-435-6374	C-3	64
81349	RCR20G102JS	5905-00-110-0196	C-6	36
81349	RCR20G105JS	5905-00-104-5756	C-5	33
			C-6	35
81349	RCR20G122JS	5905-00-141-0592	C-4	45

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FSCM	PART NUMBER	STOCK NUMBER	FIG.	ITEM
81349	RCR20G2R7JS	5905-00-111-4852	C-3	45
81349	RCR20G272JS	5905-00-141-1130	C-6	37
81349	RCR32G391JS	5905-00-141-1149	C-3	33
81349	RCR42G683JS	5905-00-154-0068	C-6	5
81349	RNC60K1001FS	5905-00-432-6410	C-7	35
81349	RNC60K1002FS	5905-00-426-7095	C-3	32
			C-6	15
81349	RNC60K1003FS	5905-00-137-0804	C-3	42
			C-6	24
81349	RNC60K1004FS	5905-00-189-2454	C-3	51
81349	RNC60K1102FS	5905-00-142-0903	C-3	53
81349	RNC60K1503FS	5905-00-192-3876	C-6	33
81349	RNC60K1912FS	5905-00-140-7142	C-3	55
			C-6	14
81349	RNC60K2001FS	5905-00-138-1285	C-3	52
			C-7	36
81349	RNC60K2002FS	5905-00-426-7121	C-3	56
81349	RNC60K2003FS	5905-00-451-7414	C-3	49
			C-4	11
81349	RNC60K2492FS	5905-00-192-3880	C-3	58
81349	RNC60K2493FS	5905-00-192-3882	C-3	59
81349	RNC60K2494FS	5905-01-030-2894	C-3	60
81349	RNC60K3012FS	5905-00-195-6384	C-3	50
81349	RNC60K4022FS		C-4	14
81349	RNC60K4532FS	5905-00-142-0902	C-3	67
81349	RNC60K4991FS	5905-00-451-7532	C-3	66
81349	RNC60K4992FS	5905-00-189-2477	C-3	43
81349	RNC60K6043FS	5905-00-365-5560	C-3	61
81349	RWR80U3R90F		C-6	47
56289	TVA1311	5910-00-783-7899	C-6	42
56289	TVA1613	5910-00-615-4674	C-6	1
27556	XV2C274J	5910-01-006-7757	C-3	29
26916	058-001691	5962-01-039-9414	C-3	5
			C-4	41
06776	1CN-083-S3-G	4920-01-086-1502	C-3	6
01295	1N459A	5961-00-247-1442	C-3	21
04713	1N4753A	5961-00-089-3576	C-3	12
			C-7	37
04713	1N5001	5961-00-682-0673	C-6	38
91929	1RA4	5930-00-779-6723	C-2	32
77820	10-150-913-8		C-1	48
00613	10SL	5340-00-678-6450	C-1	46
83330	1099	5940-00-192-9962	C-5	35
99866	11		C-1	3
		6625-01-077-8349	C-7	
75915	121002	5999-00-177-1694	C-5	28
99866	135M11		C-1	2
		4920-01-037-4089	C-5	
83330	1410-14	5940-00-578-9896	C-2	16
99866	177M6A		C-1	1
		4920-01-042-8519	C-2	

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FSCM	PART NUMBER	STOCK NUMBER	FIG.	ITEM
02111	18-1-31	4920-01-087-1622	C-2	27
56289	192P10352	5910-00-965-9729	C-4	5
			C-6	17
04713	2N3904	5961-00-892-8706	C-3	13
			C-4	38
			C-6	22
04713	2N3906	5961-00-931-0372	C-3	8
			C-4	16
			C-6	20
04713	2N4443	5961-00-147-9588	C-6	6
04713	2N4871	5961-00-433-5809	C-4	17
80131	2N4918	5961-00-728-6941	C-2	35
02735	2N6292	5961-01-039-7384	C-6	48
56289	225P10494XD3	5910-01-027-9478	C-4	26
14752	230B1B105J		C-3	2
14752	230B1C473J	5910-01-031-1451	C-4	18
14752	230B1F472J	5910-01-014-3285	C-4	6
75915	275-002	5920-00-811-8879	C-7	39
75915	275001	5920-00-908-1929	C-3	16
56289	292P10252	5910-00-506-7036	C-3	9
			C-4	9
56289	292P10452	5910-01-032-1819	C-3	10
			C-6	52
56289	292P15352	5910-00-506-7011	C-6	10
56289	30D256G050CC2	5910-00-463-9490	C-3	15
99866	3030AN	4920-01-093-4775	C-1	17
99866	3159	4920-01-086-1521	C-1	24
99866	348		C-1	5
99866	3411	7610-01-123-3224	C-1	53
99866	3413	7610-01-165-2799	C-1	54
99866	3438	7610-01-123-3225	C-1	55
99866	355	6240-00-498-2714	C-1	26
			C-5	29
99866	3597	1615-01-089-8578	C-1	52
80294	3610S1-503	5905-01-045-8019	C-5	8
99866	3875	7610-01-123-3226	C-1	57
76854	399260-AM	5930-01-095-2262	C-2	30
99866	4020	7610-01-123-3223	C-1	58
04423	41-0118-01	5961-00-568-8661	C-4	28
			C-5	12
99866	4173	7610-01-123-3227	C-1	61
99866	41778	6635-01-070-9566	C-1	16
99866	4262	7610-01-006-4428	C-1	59
99866	4273	7610-01-123-3221	C-1	60
99866	4280	7610-01-136-9822	C-1	49
99866	4290	7610-01-132-0157	C-1	49
13103	43-77-7	5970-01-094-1581	C-2	
99866	4300	7610-01-131-9691	C-1	51
44655	4569	5905-00-436-2056	C-4	43
44655	4642	5905-00-833-4321	C-6	2
76493	4668	5950-00-645-3699	C-3	17

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FSCM	PART NUMBER	STOCK NUMBER	FIG.	ITEM
99866	47	6670-01-005-8021	C-1	4
76545	488		C-1	13
56289	5GAS10	5910-00-828-5705	C-3	14
			C-4	47
			C-5	32
78189	511-041800-00	5310-00-836-3520	C-2	37
			C-2	40
			C-2	43
			C-2	46
			C-6	46
			C-6	50
			C-7	33
78189	511-061800-00	5310-00-063-7360	C-5	16
			C-7	6
			C-7	16
02111	534-202/202	5905-01-048-4262	C-2	21
96214	537238-1	5935-00-050-5387	C-5	5
60705	563CY5SBA250EC10 3Z	5910-00-937-1328	C-3	3
			C-4	12
28520	6P-4	4920-01-087-1627	C-2	7
			C-7	42
49956	70-2WD2G	5355-00-994-3435	C-5	9
09353	7101-J3-ZG		C-7	41
83330	711BLACK		C-1	11
83330	711RED		C-1	12
73138	72RXW1K	5905-01-095-9941	C-7	34
73138	72RXW10K	5905-00-208-4285	C-3	57
			C-6	13
73138	72RXW2K	5905-01-095-9938	C-3	54
78138	72RXW20K	5905-01-208-6335	C-4	10
73138	72RXW50K	5905-01-095-9940	C-3	62
09353	7527-2	5930-01-044-4117	C-2	49
99059	7545C	5935-01-079-3215	C-1	9
09353	8125W	5930-01-095-2023	C-2	31
09353	8125Z	5930-01-061-8093	C-2	33
09353	8225Z	5930-01-095-2022	C-2	34
83330	8445	5340-01-039-8020	C-2	14
81133	951-401404	5910-01-095-6185	C-5	22
02660	9779-513-6	5365-01-018-5455	C-2	5
			C-7	45

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FIG.	ITEM	STOCK NUMBER	FSCM	PART NUMBER
C-1	1		99866	177M6A
C-1	2		99866	135M11
C-1	3		99866	11
C-1	4	6670-01-005-8021	99866	47
C-1	5		99866	34B
C-1	6	4920-01-086-1509	99866	B3140-1
C-1	7	5935-00-878-6943	96906	MS3102R16-11S
C-1	8	5935-00-688-4026	96906	MS3057-8A
C-1	9	5935-01-079-3215	99059	7545C
C-1	10	4920-01-086-1511	99866	B3140-5
C-1	11		83330	711BLACK
C-1	12		83330	711RED
C-1	13		76545	48B
C-1	14	4920-01-086-1510	99866	B3140-9
C-1	15	6240-00-155-8714	96906	MS25231-313
C-1	16	6635-01-070-9566	99866	4177B
C-1	17	6625-00-895-2086	99866	3030AN
C-1	18	4920-01-086-1518	99866	A3428-2
C-1	19	4920-01-086-1517	99866	A3387
C-1	20	4920-01-086-1514	99866	A3382
C-1	21	4920-01-086-1524	99866	A3383
C-1	22	4920-01-086-1520	99866	A3104
C-1	23	9390-01-004-5480	99866	A3300
C-1	24	4920-01-086-1521	99866	3159
C-1	25		99866	A3160
C-1	26	6240-00-498-2714	99866	35S
C-1	27	4920-01-089-0447	99866	B3380
C-1	28	4920-01-046-7357	99866	B4305
C-1	29	4920-01-086-1515	99866	B3251
C-1	30	4920-01-086-1523	99866	C4559
C-1	31	4920-01-086-1522	99866	C4758
C-1	32	4920-01-173-4537	99866	B3103-1
C-1	33	4920-01-173-4538	99866	B3103-2
C-1	34	4920-01-086-1506	99866	A3529
C-1	35	5935-00-199-3335	96906	MS3106A16-11P
C-1	36	5935-00-686-0038	96906	MS3106A16-11SC
C-1	37	5935-00-688-4026	96906	MS3057-8A
C-1	38	6150-01-047-8111	99866	A3319-2
C-1	39	5935-01-196-1068	96906	MS3456W10SL-4P
C-1	40		96906	MS3057-4A
C-1	41		99866	A4269
C-1	42	5935-00-539-2651	96906	MS3106A10SL4S
C-1	43	5995-01-087-0020	99866	A4296-1
C-1	44		99866	A4296-2
C-1	45		71468	CA3106A-10SL-3P
C-1	46	5340-00-670-6450	00613	10SL
C-1	47		77820	PIC4P8-3S
C-1	48		77820	10-150-913-8
C-1	49	7610-01-132-0157	99866	4290
C-1	49	7610-01-132-9852	99866	4280
C-1	51	7610-01-131-9691	99866	4300

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FIG.	ITEM	STOCK NUMBER	FSCM	PART NUMBER
C-1	52	1615-01-089-8578	99866	3597
C-1	53	7610-01-123-3224	99866	3411
C-1	54	7610-01-165-2799	99866	3413
C-1	55	7610-01-123-3225	99866	3438
C-1	56	4920-01-046-7359	99866	A3471
C-1	57	7610-01-123-3226	99866	3875
C-1	58	7610-01-123-3223	99866	4020
C-1	59	7610-01-006-4428	99866	4262
C-1	60	7610-01-123-3221	99866	4273
C-1	61	7610-01-123-3227	99866	4173
C-1	62	5975-00-111-3208	96906	MS3367-5
C-2		4920-01-042-8519	99866	177M6A
C-2		5970-01-094-1581	13103	43-77-7
C-2		6150-01-046-7396	99866	A4185
C-2	1	4920-01-087-1621	99866	C4125
C-2	2	5305-00-494-7333	96906	MS51957-13B
C-2	3	5935-00-199-3335	96906	MS3106A16-11P
C-2	4		81349	M85049/41-8W
C-2	5	5365-01-018-5455	02660	9779-513-6
C-2	6	6145-01-211-3376	99866	A4335
C-2	7	4920-01-087-1627	28520	6P-4
C-2	8		99866	C4146
C-2	9	5305-00-054-6652	96906	MS51957-28
C-2	10	4920-01-046-7353	99866	A4381-1
C-2	11	5305-00-448-6500	96906	MS51957-28B
C-2	12		99866	B4193
C-2	13	5305-00-054-6652	96906	MS51957-28
C-2	14	5340-01-039-8020	83330	8445
C-2	15	5305-00-448-6500	96906	MS51957-28B
C-2	16	5940-00-578-9896	83330	1410-14
C-2	17	6625-01-045-7003	99866	A3307
C-2	19	5310-00-933-8118	96906	MS35338-135
C-2	20	5310-00-934-9748	96906	MS35649-244
C-2	21	5905-01-048-4262	02111	534-202/202
C-2	22	5360-00-182-5494	99866	A2047
C-2	23	5305-01-029-8876	96906	MS51957-36B
C-2	24	5310-00-616-3555	96906	MS35333-71
C-2	25	5310-00-807-1465	96906	MS21042-06
C-2	26	4920-01-046-7352	99866	A4338
C-2	27	4920-01-087-1622	02111	18-1-31
C-2	28	5355-00-628-4509	32767	B506
C-2	29	5930-01-095-4075	71590	PSA-214
C-2	30	5930-01-095-2265	76854	399260-AM
C-2	31	5930-01-095-2023	09353	8125W
C-2	32	5930-00-779-6753	91929	1PA4
C-2	33	5930-01-061-8095	09353	8125Z
C-2	34	5930-01-095-2022	09353	8125Y
C-2	35	5961-00-728-6941	80131	2N4918
C-2	36	5305-00-242-7275	96906	MS51957-15B
C-2	37	5310-00-836-3520	78189	511-041800-00
C-2	38	5935-00-807-9308	96906	MS3102R14S5S

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FIG.	ITEM	STOCK NUMBER	FSCM	PART NUMBER
C-2	39	5305-00-242-7275	96906	MS51957-15B
C-2	40	5310-00-836-3520	78189	511-041800-00
C-2	41	5935-00-400-4847	96906	MS3102R10SL3S
C-2	42	5305-00-242-7275	96906	MS51957-15B
C-2	43	5310-00-836-3520	78189	511-041800-00
C-2	44		96906	MS3102E10SL4S
C-2	45	5305-00-242-7275	96906	MS51957-15B
C-2	46	5310-00-836-3520	78189	511-041800-00
C-2	47	5940-00-682-2477	96906	MS77068-1
C-2	48	5975-00-616-0546	95146	G12B
C-2	49	5930-01-044-4117	09353	7527-2
C-2	50	5961-00-059-2904	81349	JAN1N3613
C-2	51	4920-01-087-9156	99866	C4124
C-3		4920-01-046-7423	99866	C4146
C-3	1	5961-00-892-0734	81349	JAN1N483B
C-3	2		14752	230B1B105J
C-3	3	5910-00-937-1328	60705	563CY5SBA250EC10 3Z
C-3	4	5910-00-821-5215	81349	CK60AX471K
C-3	5	5962-01-039-9414	26916	058-001691
C-3	6	4920-01-086-1502	06776	1CN-083-S3-G
C-3	7	5961-00-232-3808	81349	JAN1N4464
C-3	8	5961-00-931-0372	04713	2N3906
C-3	9	5910-00-506-7036	56289	292P10252
C-3	10	5910-01-032-1819	56289	292P10452
C-3	11	5910-00-113-5499	81349	M39014/02-1350
C-3	12	5961-00-089-3576	04713	1N4753A
C-3	13	5961-00-892-8706	04713	2N3904
C-3	14	5910-00-828-5705	56289	5GAS10
C-3	15	5910-00-463-9490	56289	30D256G050CC2
C-3	16		75915	275001
C-3	17	5950-00-645-3699	76493	4668
C-3	18	5961-00-158-4786	81349	JAN1N4460
C-3	19	5961-00-162-9780	04713	MPSA56
C-3	20	5961-00-059-2904	81349	JAN1N3613
C-3	21	5961-00-247-1442	01295	1N459A
C-3	22	5910-00-007-2004	81349	M39003/01-3088
C-3	23	5910-00-822-3765	81349	CK60BX101K
C-3	24	5910-01-007-4094	27556	BA2A602F
C-3	25	5910-01-008-6755	27556	BA2A543F
C-3	26	5962-01-057-7884	81349	M38510/10101BPC
C-3	27	5910-01-095-2239	27556	BA2A593F
C-3	28	5910-00-113-5475	81349	M39003/01-3006
C-3	29	5910-01-006-7757	27556	XV2C274J
C-3	30	5910-00-113-9906	81349	M39003/01-2993
C-3	31	5910-00-007-2001	81349	M39003/01-2966
C-3	32	5905-00-426-7095	81349	RNC60K1002FS
C-3	33	5905-00-141-1149	81349	RCR32G391JS
C-3	34	5905-00-126-6683	81349	RCR07G332JS
C-3	35	5905-00-110-0388	81349	RCR07G104JS
C-3	36	5905-00-105-7764	81349	RCR07G222JS

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FIG.	ITEM	STOCK NUMBER	FSCM	PART NUMBER
C-3	37	5905-00-106-3666	81349	RCR07G103JS
C-3	38	5905-00-116-8556	81349	RC?07G223JS
C-3	39	5905-00-110-7620	81349	RCR07G102JS
C-3	40	5905-00-135-3971	81349	RCR07G150JS
C-3	41	5905-00-141-0717	81349	RCR07G473JS
C-3	42	5905-00-137-0804	81349	RNC60K1003FS
C-3	43	5905-00-189-2477	81349	RNC60K4992FS
C-3	44	5905-00-104-8358	81349	RCR07G822JS
C-3	45	5905-00-111-4852	81349	RCR20G2R7JS
C-3	46	5905-00-106-1356	81349	RCR07G152JS
C-3	47	5905-00-141-1183	81349	RCR07G101JS
C-3	48	5905-00-107-0656	81349	RCR07G100JS
C-3	49	5905-00-451-7414	81349	RNC60K2003FS
C-3	50	5905-00-195-6384	81349	RNC60K3012FS
C-3	51	5905-00-189-2454	81349	RNC60K1004FS
C-3	52	5905-00-138-1285	81349	RNC60K2001FS
C-3	53	5905-00-142-0903	81349	RNC60K1102FS
C-3	54	5905-01-095-9938	73138	72RXW2K
C-3	55	5905-00-140-7142	81349	RNC60K1912FS
C-3	56	5905-00-426-7121	81349	RNC60K2002FS
C-3	57	5905-00-208-4285	73138	72RXN10K
C-3	58	5905-00-192-3880	81349	RNC60K2492FS
C-3	59	5905-00-192-3882	81349	RNC60K2493FS
C-3	60	5905-01-030-2894	81349	RNC60K2494FS
C-3	61	5905-00-365-5560	81349	RNC60K6043FS
C-3	62	5905-01-095-9940	73138	72RXW50K
C-3	63	5905-00-118-4559	81349	RCR07G333JS
C-3	64	5905-00-435-6374	81349	RCR07G823JS
C-3	65	5905-00-116-8554	81349	RCR07G105JS
C-3	66	5905-00-451-7532	81349	RNC60K4991FS
C-3	67	5905-00-142-0902	81349	RNC60K4532FS
C-3	68	5905-00-135-3973	81349	RCR07G221JS
C-3	69		99866	AW4133
C-4		4920-01-046-7422	99866	B4193
C-4	1	5905-00-141-0717	81349	RCR07G473JS
C-4	2	5905-00-106-3666	81349	RCR07G103JS
C-4	3	5910-00-838-9421	81349	CK60AW102M
C-4	4	5961-00-842-9564	81349	JAN1N914
C-4	5	5910-00-965-9729	56289	192P10352
C-4	6	5910-01-014-3285	14752	230B1F472J
C-4	7	5910-00-822-3765	81349	CK60BX101K
C-4	8	5905-00-126-6694	81349	RCR07G475JS
C-4	9	5910-00-506-7036	56289	192P10252
C-4	10	5905-01-208-6335	73138	72RXW20K
C-4	11	5905-00-451-7414	81349	RNC60K2003FS
C-4	12	5910-00-937-1328	60705	563C1550A250EC10 52
C-4	13	5910-00-186-9286	05079	HV3.9-450C4LP1
C-4	14	5905-00-758-3436	81349	RNC60K4022FS
C-4	15	5905-00-104-8358	81349	RCR07G822JS
C-4	16	5961-00-931-0372	04713	2N3906

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FIG.	ITEM	STOCK NUMBER	FSCM	PART NUMBER
C-4	17	5961-00-433-5809	04713	2N4871
C-4	18	5910-01-031-1451	14752	230B1C473J
C-4	19	5910-00-494-6088	60705	C016B102E271K
C-4	20	5961-00-556-2091	81349	JAN1N270
C-4	21	5905-00-114-0711	81349	RCR07G472JS
C-4	22	5962-00-740-5873	04713	MC939L
C-4	23	5935-01-064-1580	06776	ICN-143-S3-G
C-4	24	5962-00-595-8504	81349	M38510/01501BEB
C-4	25	5935-01-083-4122	06776	ICN-163-S3-G
C-4	26	5910-01-027-9478	56289	225P10494XD3
C-4	27	5962-00-324-2195	81349	M38510/01005BEB
C-4	28	5961-00-568-8661	04423	41-0118-01
C-4	29	5962-00-369-7621	81349	M38510/00202BCB
C-4	30	5962-00-378-0216	81349	M38510/00303BCB
C-4	31	5905-00-135-6046	81349	RCR07G681JS
C-4	32	5905-01-138-6236	81349	RCR07G680JS
C-4	33	5962-01-040-1425	81349	M38510/10802BCB
C-4	34	5905-00-110-7620	81349	RCR07G102JS
C-4	35	5905-00-135-3973	81349	RCR07G221JS
C-4	36	5905-00-110-0388	81349	RCR07G104JS
C-4	37	5910-00-852-4039	14655	CD15FD501G03
C-4	38	5961-00-892-8706	04713	2N3904
C-4	39	5905-00-141-0744	81349	RCR07G562JS
C-4	40	5905-00-141-0743	81349	RCR07G392JS
C-4	41	5962-01-039-9414	26916	058-001691
C-4	42	5935-01-028-9329	06776	ICN-083-S3-G
C-4	43	5905-00-436-2056	44655	4569
C-4	44	5905-00-113-4861	81349	RCR07G390JS
C-4	45	5905-00-141-0592	81349	RCR20G122JS
C-4	46	5910-01-200-8343	81349	M39018/01-1018P
C-4	47	5910-00-828-5705	56289	5GAS10
C-4	48	5961-00-826-9048	81349	JAN1N3020B
C-4	49	5905-00-106-3668	81349	RCR07G220JS
C-4	50	5905-00-116-8554	81349	RCR07G105JS
C-4	51	5905-00-126-6683	81349	RCR07G332JS
C-4	52		99866	AW4200
C-5		4920-01-037-4089	99866	135M11
C-5		4920-01-086-1505	99866	A6839
C-5		4920-01-087-4233	99866	A4006
C-5		4920-01-093-4772	99866	A4005
C-5		6150-01-047-7064	99866	A2917
C-5		6240-01-043-3258	99866	A3989
C-5	1	5305-00-494-7333	96906	MS51957-13B
C-5	2	5310-00-687-6664	96906	MS15795-804B
C-5	3	5310-00-550-3715	96906	MS35333-70
C-5	4		99866	C3984
C-5	5	5935-00-050-5387	96214	517238-1
C-5	6	5305-00-182-9459	96906	MS51957-17B
C-5	7	4920-01-046-7354	99866	A4175
C-5	8	5905-01-045-8019	80294	361051-503
C-5	9	5355-00-994-3435	49956	70-2WD2G

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C-5	10	5961-00-059-2904	81349	JAN1N3613
C-5	11	5930-00-240-6008	71590	PSA207
C-5	12	5961-00-568-8661	04423	41-0118-01
C-5	13		34148	FLS001
C-5	14	5950-01-044-8757	99866	A3934
C-5	15	5305-00-448-6500	96906	MS51957-28B
C-5	16	5310-00-063-7360	78189	511-061800-00
C-5	17	5940-00-050-2308	96906	MS35431-3
C-5	18	4920-01-086-1508	99866	B3971
C-5	19	5961-00-469-2189	81349	JAN1N5554
C-5	20	5910-01-045-8170	99866	A3975
C-5	21	5305-00-448-6547	96906	MS51957-27B
C-5	22	5910-01-095-6185	81133	951-401404
C-5	23	5910-01-045-0114	14655	OTBG205K
C-5	24	4920-01-046-8674	99866	A3993
C-5	25	5305-00-448-6456	96906	MS51957-31B
C-5	26	6210-00-181-2556	99866	A1436-1
C-5	27	5310-01-096-7381	96906	MS51865-1B
C-5	28	5999-00-177-1694	75915	121002
C-5	29	6240-00-498-2714	99366	35S
C-5	30	5305-00-469-5382	96906	MS51957-30B
C-5	31	5961-00-469-2189	81349	JAN1N5554
C-5	32	5910-00-828-5705	56289	5GAS10
C-5	33	5905-00-104-5756	81349	RCR20G105JS
C-5	34	5950-00-211-2158	99866	A2670-1
C-5	35	5940-00-192-9962	83330	1099
C-5	36	5305-00-054-6650	96906	MS51957-26
C-5	37	5310-00-807-1465	96906	MS21042-06
C-5	38	4920-01-023-5189	99866	A2604
C-5	40	5970-01-045-0711	99866	A4253
C-5	41	4920-01-023-5191	99866	A2510
C-5	42	5360-00-182-5494	99866	A2047
C-5	43	6240-01-043-3259	99866	A3988
C-5	44	5935-00-201-7983	96906	MS3106A14S5P
C-5	45	5935-01-137-2305	81349	M85049/41-16A
C-5	46		99866	A2916
C-5	47	5305-00-448-6500	96906	MS51957-28B
C-5	48	5310-00-616-3555	96906	MS35333-71
C-5	49	4920-01-089-0445	99866	D4597
C-5	50	5305-00-428-0732	96906	MS51957-34B
C-5	51	5310-00-807-1465	96906	MS21042-06
C-5	52	6930-01-043-9621	95146	MPA-904749
C-5	53	4920-01-086-1513	99866	A4714
C-5	54	4920-01-086-1512	99866	B4713
C-5	55	4920-01-089-0448	99866	C3972
C-5			99866	C3984
C-6	1	5910-00-615-4674	56289	TVA1613
C-6	2	5905-00-833-4321	44655	4642
C-6	3	5961-00-059-2904	81349	JAN1N3613
C-6	4	5910-01-022-5062	25088	B32231-22-10-400
C-6	5	5905-00-154-0068	81349	RCR42G683JS

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C-6	6	5961-00-147-9588	04713	2N4443
C-6	7	5910-00-113-5475	81349	M39003/01-3006
C-6	8	5961-00-147-9600	81349	JAN1N4467
C-6	9	5905-00-106-3666	81349	RCR07G103JS
C-6	10	5910-00-506-7011	56289	292P15352
C-6	11	5905-00-105-7764	81349	RCR07G222JS
C-6	12	5961-00-842-9864	81349	JAN1N914
C-6	13	5905-00-208-4285	73138	72RXW10K
C-6	14	5905-00-140-7142	81349	RNC60K1912FS
C-6	15	5905-00-426-7095	81349	RNC60K1002FS
C-6	16	5905-00-116-8554	81349	RCR07G105JS
C-6	17	5910-00-965-9729	56289	192P10352
C-6	18	5905-00-141-1183	81349	RCR07G101JS
C-6	19	5910-01-187-1629	81349	CFR06ARB223FM
C-6	20	5961-00-931-0372	04713	2N3906
C-6	21	5961-00-618-9955	04713	MPU132
C-6	22	5961-00-892-8706	04713	2N3904
C-6	23	5910-01-055-7758	27556	BA2A204F
C-6	24	5905-00-137-0304	81349	RNC60K1003FS
C-6	25	5961-00-892-0734	81349	JAN1N483B
C-6	26	5905-00-141-0717	81349	RCR07G473JS
C-6	27	5910-01-055-8412	27556	BA2A663F
C-6	28	5910-00-577-1138	96095	BCD1-6-103GMV1KV
C-6	29	5905-00-141-0744	81349	RCR07G562JS
C-6	30	5905-00-114-5339	81349	RCR07G154JS
C-6	31	5905-00-119-3505	81349	RCR07G683JS
C-6	32	5905-00-116-8555	81349	RCR07G153JS
C-6	33	5905-00-192-3876	81349	RNC60K1503FS
C-6	34	5910-01-187-1629	81349	CFR06ARB223FM
C-6	35	5905-00-104-5756	81349	RCR20G105JS
C-6	36	5905-00-110-0196	81349	RCR20G102JS
C-6	37	5905-00-141-1130	81349	RCR20G272JS
C-6	38	5951-00-682-0673	04713	1N5001
C-6	39	5950-01-045-7710	99866	A3943
C-6	40	5905-00-126-6683	81349	RCR07G332JS
C-6	41	5945-00-201-8667	79318	K19
C-6	42	5910-00-783-7899	56289	TVA1311
C-6	43	5999-01-095-2311	99866	A4421
C-6	44	5305-00-054-5647	96906	MS51957-13
C-6	46	5310-00-836-3520	78189	511-041800-00
C-6	47		81349	RWR80U3090F
C-6	48	5961-01-039-7384	02735	2N6292
C-6	49	5305-00-054-5649	96906	MS51957-15
C-6	50	5310-00-836-3520	78189	511-041800-00
C-6	51	5920-00-782-6179	81349	FM02-125V-5A
C-6	52	5910-01-032-1819	56289	292P10452
C-6	53		99866	AW3983
C-6	54	4920-01-087-4200	99866	A4085-1
C-6	55	4920-01-087-4201	99866	A4085-2
C-7		4920-01-093-4771	99866	A4614
C-7		6150-01-046-7396	99866	A4185

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FIG.	ITEM	STOCK NUMBER	FSCM	PART NUMBER
C-7		6625-01-077-8349	99866	11
C-7	1	4920-01-087-1618	99866	B4578
C-7	2	5305-00-448-6500	96906	MS51957-28B
C-7	4	4920-01-087-1620	99866	B4580
C-7	5	5305-00-448-6500	96906	MS51957-28B
C-7	6	5310-00-063-7360	78189	511-061800-00
C-7	7	5305-00-054-6654	96906	MS51957-30
C-7	8	4920-01-087-1614	99866	A4576
C-7	9	5305-00-242-7275	96906	MS51957-15B
C-7	10	4920-01-087-1615	99866	A4577
C-7	12	4920-01-086-1500	99866	C4264
C-7	13	5305-00-242-7275	96906	MS51957-15B
C-7	14	4920-01-086-1501	99866	A4543
C-7	15	5305-00-448-6500	96906	MS51957-28B
C-7	16	5310-00-063-7360	78189	511-061800-00
C-7	17	4920-01-087-1613	99866	A4536
C-7	18	5305-00-763-6961	96906	MS51959-26
C-7	19	4920-01-086-1504	99866	B4539
C-7	21	4920-01-086-1503	99866	A4537
C-7	22	5305-00-054-6652	96906	MS51957-28
C-7	23	4920-01-087-1616	99866	B4540
C-7	24	5360-01-094-6945	99866	A4538
C-7	25	4920-01-087-1617	99866	B4541
C-7	28	4920-01-093-4770	99866	NHM-5FTC
C-7	30	5935-00-878-6943	96906	MS3102R16-11S
C-7	31	5305-00-242-7275	96906	MS51957-15B
C-7	32	5305-00-182-9459	96906	MS51957-17B
C-7	33	5310-00-836-3520	78189	511-041800-00
C-7	34	5905-01-095-9941	73138	72RXW1K
C-7	35	5905-00-432-6410	81349	RNC60K1001FS
C-7	36	5905-00-138-1285	81349	RNC60K2001FS
C-7	37	5961-00-089-3576	04713	1N4753A
C-7	38	5961-00-059-2904	81349	JAN1N3613
C-7	39	5920-00-811-8879	75915	275-002
C-7	40		99866	AW45B1
C-7	41		09353	7101-J3-ZG
C-7	42	4920-01-087-1627	28520	6P-4
C-7	43	5935-00-199-3335	96906	MS3106A16-11P
C-7	44		81349	M35049/41-8W
C-7	45	5365-01-018-5455	02660	9779-513-6
C-7	46	6145-01-211-3376	99866	A4335
C-7	47	4920-01-087-1619	99866	B4579

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By Order of the Secretary of the Army:

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General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Major General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31 Operator Maintenance Requirements for All Fixed and Rotor Wing Aircraft.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN...JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
COA, 3d ENGINEER BN
FT. LEONARD WOOD MO 63108

DATE

PUBLICATION NUMBER	DATE	TITLE
TM 55-4920-402-13&P	15 Aug 80	Vibrex Balancing Kit, Part No. B4591, NSN 4920-01-040-7816

BE EXACT...PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.
6	2-1 a		
81		4-3	
125	line 20		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders.

Callout 16 on figure 4-3 is pointing at a bolt. In the key to fig. 4-3, item 16 is called a skim. Please correct one or the other.

I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gaskit but it doesn't fit. Supply says I got what I ordered so the NSN is wrong Please give me a good NSN.

SAMPLE

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE:
John Doe

DA FORM 1 AUG 74 2028-2 (TEST)

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

DRSTS-M Overprint 1, 1 Nov 78

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TEAR ALONG DOTTED LINE

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REVERSE OF DA FORM 2028-2

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REVERSE OF DA FORM 2028-2

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimenter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigrams = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.82 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimenter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*
inches	centimeters	2.540
feet	meters	.305
yards	meters	.914
miles	kilometers	1.609
square inches	square centimeters	6.451
square feet	square meters	.093
square yards	square meters	.836
square miles	square kilometers	2.590
acres	square hectometers	.405
cubic feet	cubic meters	.028
cubic yards	cubic meters	.765
fluid ounces	milliliters	29,573
pints	liters	.473
quarts	liters	.946
gallons	liters	3.785
ounces	grams	28.349
pounds	kilograms	.454
short tons	metric tons	.907
pound-feet	newton-meters	1.365
pound-inches	newton-meters	.11375

To change	*To*	*Multiply by*
ounce-inches	newton-meters	.007062
centimeters	inches	.394
meters	feet	3.280
meters	yards	1.094
kilometers	miles	.621
square centimeters	square inches	.155
square meters	square feet	10.764
square meters	square yards	1.196
square kilometers	square miles	.386
square hectometers	acres	2.471
cubic meters	cubic feet	35.315
cubic meters	cubic yards	1.308
milliliters	fluid ounces	.034
liters	pints	2.113
liters	quarts	1.057
liters	gallons	.264
grams	ounces	.035
kilograms	pounds	2.205
metric tons	short tons	1.102

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature

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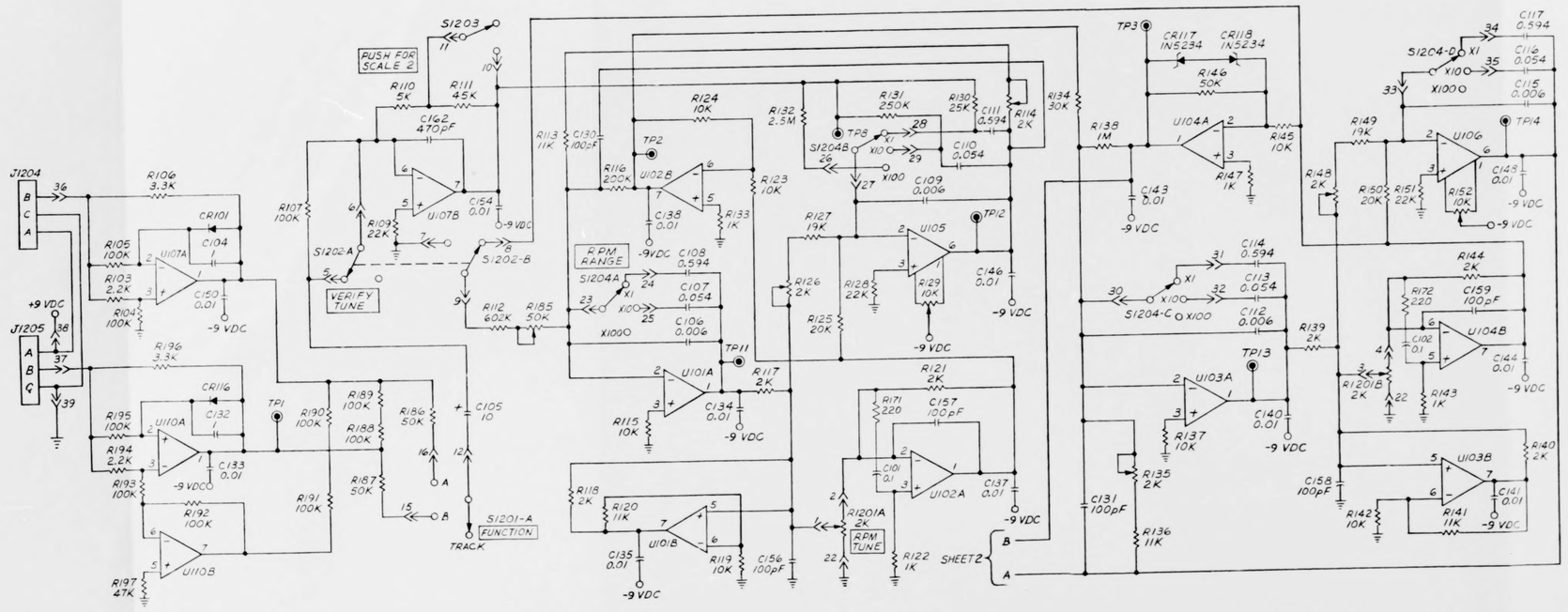
Charts Transposed to

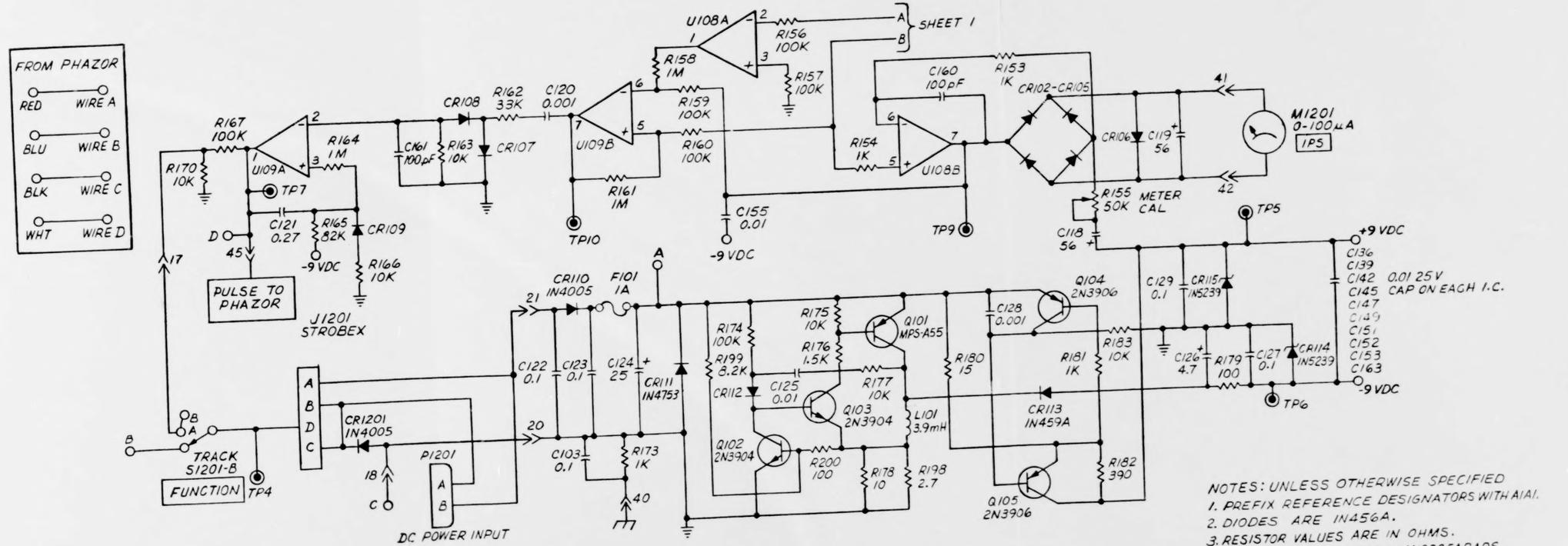
End of Volume.



NOTES: UNLESS OTHERWISE STATED

1. PREFIX REFERENCE DESIGNATORS WITH A1A1.
2. RESISTOR VALUES ARE IN OHMS.
3. CAPACITOR VALUES ARE IN MICROFARADS.
4. DIODES ARE IN456A.
5. J1204, J1205, S1201A, S1202A, S1202B, S1203, S1204A, S1204B, S1204C, S1204D, R1201A, AND R1201B ARE MOUNTED ON CHASSIS.

FO-1. Balancer Schematic Diagram (Sheet 1 of 2)



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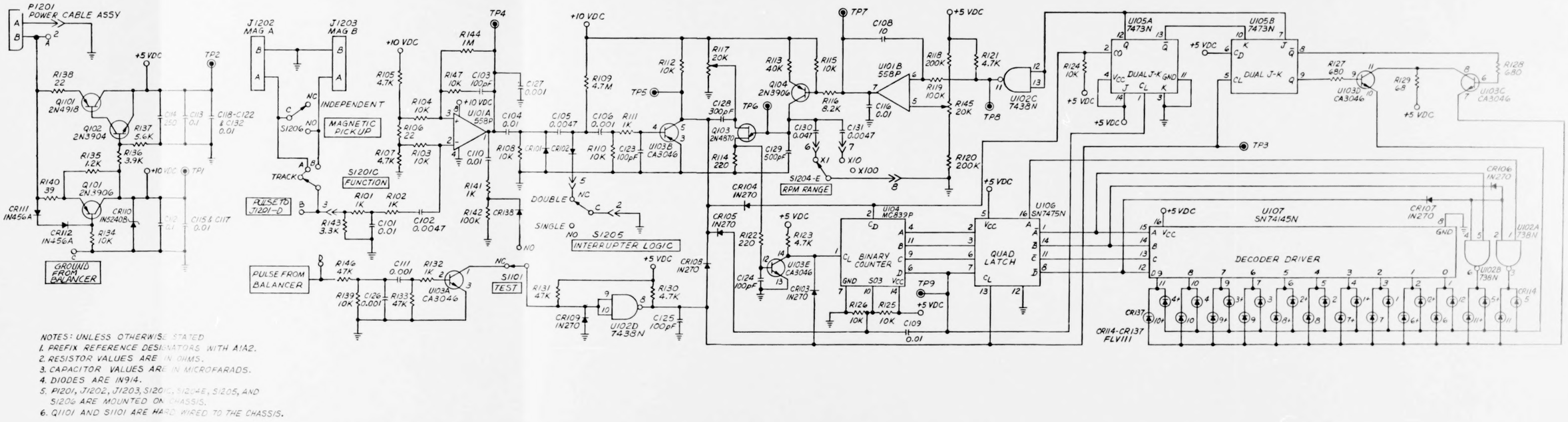
1. PREFIX REFERENCE DESIGNATORS WITH A1A1.
2. DIODES ARE IN456A.
3. RESISTOR VALUES ARE IN OHMS.
4. CAPACITOR VALUES ARE IN MICROFARADS.
5. J1201, S1201B, P1201, AND M1201 ARE MOUNTED ON CHASSIS.

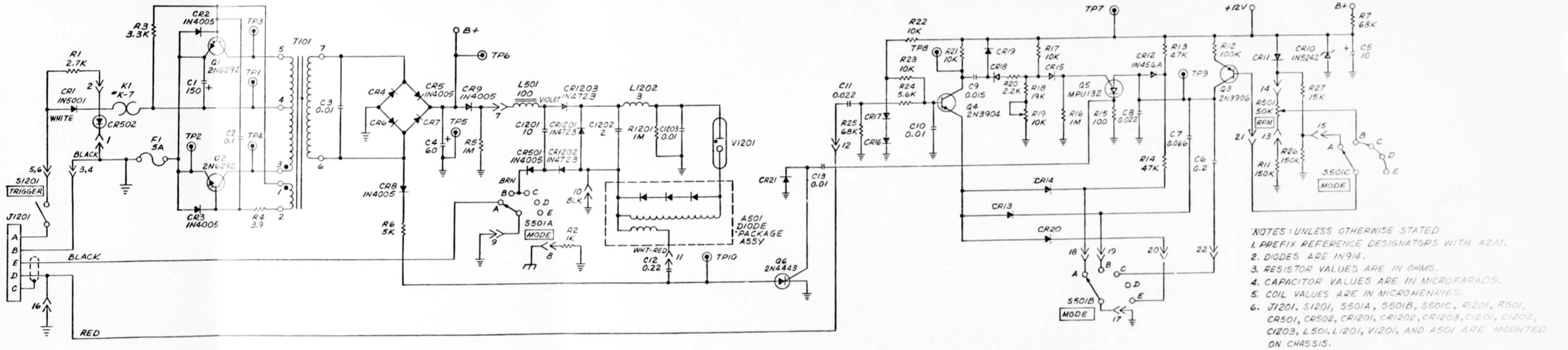
FO-1. Balancer Schematic Diagram (Sheet 2 of 2)



NOTES: UNLESS OTHERWISE STATED
1. PREFIX REFERENCE DESIGNATORS WITH A1A2.
2. RESISTOR VALUES ARE IN OHMS.
3. CAPACITOR VALUES ARE IN MICROFARADS.
4. DIODES ARE IN914.
5. P1201, J1202, J1203, S1201C, S1204E, S1205, AND S1206 ARE MOUNTED ON CHASSIS.
6. Q1101 AND S1101 ARE HARD WIRED TO THE CHASSIS.

FO-2. Phazor Schematic Diagram

best copy available



NOTES: UNLESS OTHERWISE STATED
1. PREFIX REFERENCE DESIGNATORS WITH A2A1.
2. DIODES ARE IN914.
3. RESISTOR VALUES ARE IN OHMS.
4. CAPACITOR VALUES ARE IN MICROFARADS.
5. COIL VALUES ARE IN MICROHENRIES.
6. J1201, S1201, S501A, S501B, S501C, R1201, R501, CR501, CR502, CR1201, CR1202, CR1203, C1201, C1202, C1203, L501, L1201, V1201, AND A501 ARE MOUNTED ON CHASSIS.

FO-3. Strobex Schematic Diagram